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For related information see also *Astronautics*.

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83 ECONOMICS AND COST ANALYSIS **N.A.**
Includes cost effectiveness studies.

84 LAW AND POLITICAL SCIENCE **3567**
Includes space law; international law; international cooperation; and patent policy.

85 URBAN TECHNOLOGY AND TRANSPORTATION **3567**
Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.
For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences.*

88 SPACE SCIENCES (GENERAL) **N.A.**

89 ASTRONOMY **3568**
Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

90 ASTROPHYSICS **3569**
Includes cosmology; and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION **3570**
Includes planetology; and manned and unmanned flights.
For spacecraft design see *18 Spacecraft Design, Testing and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

92 SOLAR PHYSICS **3571**
Includes solar activity, solar flares, solar radiation and sunspots.

93 SPACE RADIATION **3572**
Includes cosmic radiation; and inner and outer earth's radiation belts.
For biological effects of radiation see *52 Aerospace Medicine.* For theory see *73 Nuclear and High-Energy Physics.*

GENERAL

99 GENERAL **N.A.**

Note: N.A. means that no abstracts were assigned to this category for this issue.

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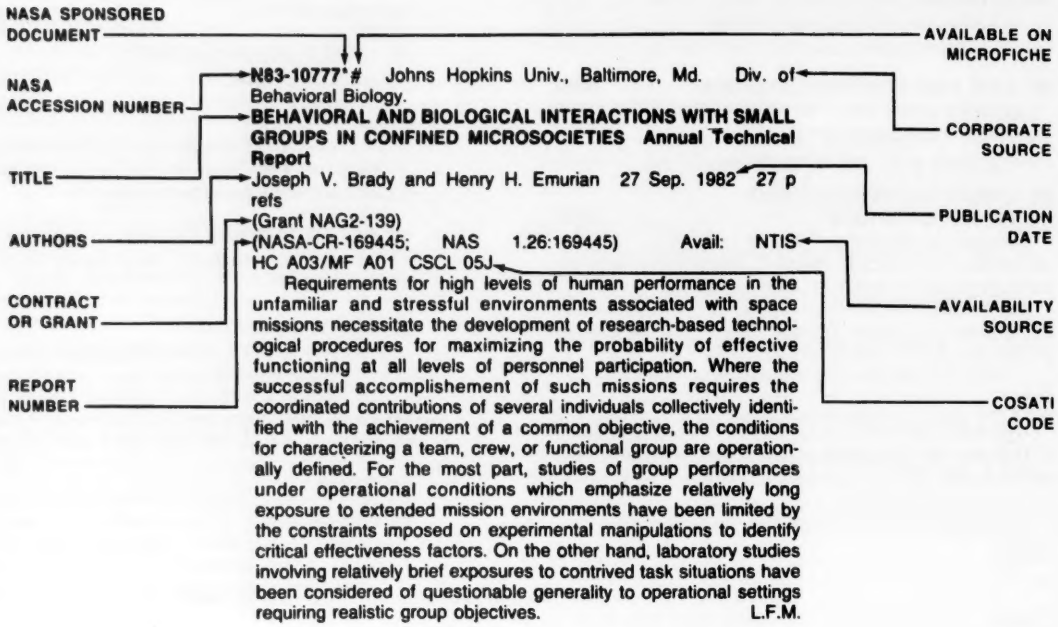
TYPICAL CITATION AND ABSTRACT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N83-10777* # Johns Hopkins Univ., Baltimore, Md. Div. of Behavioral Biology.
CORPORATE SOURCE
TITLE
BEHAVIORAL AND BIOLOGICAL INTERACTIONS WITH SMALL GROUPS IN CONFINED MICROSOCIETIES Annual Technical Report
AUTHORS
Joseph V. Brady and Henry H. Emurian 27 Sep. 1982 27 p refs
PUBLICATION DATE
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(NASA-CR-169445; NAS 1.26:169445) Avail: NTIS
AVAILABILITY SOURCE
HC A03/MF A01 CSCL 05J
COSATI CODE
Requirements for high levels of human performance in the unfamiliar and stressful environments associated with space missions necessitate the development of research-based technological procedures for maximizing the probability of effective functioning at all levels of personnel participation. Where the successful accomplishement of such missions requires the coordinated contributions of several individuals collectively identified with the achievement of a common objective, the conditions for characterizing a team, crew, or functional group are operationally defined. For the most part, studies of group performances under operational conditions which emphasize relatively long exposure to extended mission environments have been limited by the constraints imposed on experimental manipulations to identify critical effectiveness factors. On the other hand, laboratory studies involving relatively brief exposures to contrived task situations have been considered of questionable generality to operational settings requiring realistic group objectives. L.F.M.

VOLUME 21 NUMBER 21/NOVEMBER 8, 1983

Scientific and Technical Aerospace Reports

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01 AERONAUTICS (GENERAL)

N83-32707* National Aeronautics and Space Administration, Washington, D. C.
AERONAUTICAL ENGINEERING: A CONTINUING BIBLIOGRAPHY WITH INDEXES, SUPPLEMENT 164, AUGUST 1983
Aug. 1983 84 p
(NASA-SP-7037(164); NAS 1.21:7037(164)) Avail: NTIS HC $5.00 CSCL 01A

This bibliography lists 296 reports, articles and other documents introduced into the NASA scientific and technical information system in July 1983. Author

N83-32708# Cranfield Inst. of Tech., Bedfordshire (England). Coll. of Aeronautics.
A COMBAT AIRCRAFT AVAILABILITY ASSESSMENT TECHNIQUE
C. D. Burleigh and J. P. Fielding Nov. 1982 30 p refs Presented at the 4th Euredata Conf., Venice, Spring, 1983
(ISBN-0-902937-80-4; CAR-8228) Avail: NTIS HC A03/MF A01

It has always been important for military commanders to be able to rely on their equipment being available to them during a conflict. Some recent published figures, however, showed that two modern fighter aircraft were only available for missions for 47% or 56% of the time. These figures prompted a study of the causes of unavailability and the development of an availability assessment technique. Initial studies concentrated on determining probability distributions of reliability, maintainability, battle damage repair and attrition. A simple operation simulation model was then derived to show an aircrafts sensitivity to the main availability parameters. This model can be applied to any aircraft type provided that the necessary inputs can be calculated. The simulated operations were as realistic as possible, although many assumptions had to be made. The Operation Simulation Model proved to be a satisfactory means of assessing the effectiveness of a force of aircraft under war time conditions. B.W.

N83-32709# Vereinigte Flugtechnische Werke G.m.b.H., Bremen (West Germany). Metallische Werkstoffe.
DEVELOPMENT AND DEMONSTRATION OF ECONOMIC PRODUCTION SYSTEMS IN AIRFRAME CONSTRUCTION [ENTWICKLUNG UND NACHWEIS WIRTSCHAFTLICHER FERTIGUNGSVERFAHREN IM FLUGZEUGZELLENBAU]
Sep. 1982 225 p In GERMAN
Avail: NTIS HC A10/MF A01

The Alpha jet pylon; the MRCA aircraft test facilities; statistical and vibratory fatigue limit characteristics of aluminum cast alloys; and compressed titanium fine cast components are treated. Riveting, welding of aluminum cast alloy A357 components; superplastic transformation and diffusion welding of titanium alloys, and aluminum precision forging components are discussed. For individual titles, see N83-32710 through N83-32716.

N83-32710# Vereinigte Flugtechnische Werke G.m.b.H., Bremen (West Germany). Metallische Werkstoffe.
ALPHA JET-PYLON
K. F. Sahm *In its* Develop. and Demonstration of Econ. Production Systems in Airframe Construct. Sep. 1982 p 6-19 In GERMAN (For primary document see N83-32709 21-01)
Avail: NTIS HC A10/MF A01

The Alpha Jet-Pylon was investigated in order to assess the possibilities of cast components design and manufacture in airframe construction. Sample tests, evaluation, vibratory fatigue limit, finishing, and statistical component tests were performed. Sample tests of cast components in Precial-casting show that the high fatigue limit and dimensional accuracy requirements can also be obtained for large and complex components. Worse X-ray results and dimensional deviations at the back are explained and improved by a supply modification. The results of testing of sand cast components show that dimensional stability and tensile strengths pose no problems. The weight of the not completely ground component is 21 kg higher than the Precial component, but 5 kg lower than the present series pylon. Author (ESA)

N83-32711# Vereinigte Flugtechnische Werke G.m.b.H., Bremen (West Germany). Metallische Werkstoffe.
MRCA RUN-IN FLOORS [MRCA-EINLAUFBODEN]
D. Mietrach *In its* Develop. and Demonstration of Econ. Production Systems in Airframe Construct. Sep. 1982 p 20-31 In GERMAN (For primary document see N83-32709 21-01)
Avail: NTIS HC A10/MF A01

Run-in floors made of the aluminum cast alloy A357 were manufactured for the MRCA-Tornado aircraft. This primary structural member is located in the front driving mechanism run-in and takes the run-in inner pressure. Two types were ordered: Precial-cast and low pressure sand-cast. A first analysis shows that for equal weight a cost reduction of about 45% is obtained as compared to the conventional construction method. Optimization of dimensional and strength characteristics shows positive results. Author (ESA)

N83-32712# Vereinigte Flugtechnische Werke G.m.b.H., Bremen (West Germany). Metallische Werkstoffe.
STATISTICAL AND VIBRATORY FATIGUE LIMIT CHARACTERISTICS OF ALUMINUM CAST ALLOYS [STATISCHE UND SCHWINGFESTIGKEITSKENNWERTE FUER ALGUSSLEGIERUNGEN] c26
H. Frommeyer *In its* Develop. and Demonstration of Econ. Production Systems in Airframe Construct. Sep. 1982 p 32-63 In GERMAN (For primary document see N83-32709 21-01)
Avail: NTIS HC A10/MF A01

Statistical, fracture mechanics, dynamic, and crack propagation characteristics were determined for the high strength aluminum alloy A357 T6 airframe components manufactured with the Precial-cast and sand-cast procedures. Statistical tests show that the required values are obtained. Tensile test samples were statically loaded till fracture. The A357 cast alloys show similar tendencies to the aluminum alloy plate material, but lower fracture

toughness. Crack propagation tests show that Precial-cast has slightly better characteristics than sand-cast. Author (ESA)

N83-32713# Vereinigte Flugtechnische Werke G.m.b.H., Bremen (West Germany). Metallische Werkstoffe.
ADDITIONALLY COMPRESSED TITANIUM FINE CAST COMPONENTS [NACHVERDICHTETE TITAN-FEINGUSSTEILE] c26
K. Blomeier *In its* Develop. and Demonstration of Econ. Production Systems in Airframe Construct. Sep. 1982 p 64-83 In GERMAN (For primary document see N83-32709 21-01)
Avail: NTIS HC A10/MF A01

The effect of hot isostatic compression (HIP-process) on the vibratory fatigue limit behavior of titanium fine cast components was investigated. Ten upper belt fittings (HIP and non-HIP) were fatigue tested and their mechanical-technological properties investigated. Metallographic and X-ray tests show that inner defects are removed by the HIP-process. Static fatigue limit values of hipped components are slightly better than these of HIP-components. The vibratory fatigue limit behavior of HIP and non-HIP-components is improved by additional surface treatment. The use of titanium casts in aircraft construction is required for fatigue limit and cost reduction reasons. Author (ESA)

N83-32714# Vereinigte Flugtechnische Werke G.m.b.H., Bremen (West Germany). Metallische Werkstoffe.
ECONOMIC RIVETING [WIRTSCHAFTLICHES NIETEN] c37
K. Hoffer and R. Meier *In its* Develop. and Demonstration of Econ. Production Systems in Airframe Construct. Sep. 1982 p 84-126 In GERMAN (For primary document see N83-32709 21-01)
Avail: NTIS HC A10/MF A01

Riveted test rods made of the aluminum cast alloy A357 T6 were tested under single flight load FALSTAFF simulation in order to investigate the influence of the connecting element in the rod, and of the drilling procedure. As compared to riveted AGARD test rods made of the aluminum wrought alloy 3.4364 T7351, the vibratory fatigue limit of the aluminum cast alloy is lower in the domain between 2 times 10 to the 4th power and 5 times 10 to the 4th power simulated flights. From 6 times 10 to the 4th power flights on it is equal or better. The results of different evaluations of fatigue resistant fasteners are found to be similar. Small differences are probably due to differences in geometry and material. Author (ESA)

N83-32715# Vereinigte Flugtechnische Werke G.m.b.H., Bremen (West Germany). Metallische Werkstoffe.
WELDING OF COMPONENTS MADE OF THE ALUMINUM CAST ALLOY A357 [SCHWEISSEN VON BAUTEILEN AUS DER AL-GUSSLEGIERUNG A357] c37
G. Neye and A. Kolley *In its* Develop. and Demonstration of Econ. Production Systems in Airframe Construct. Sep. 1982 p 127-159 In GERMAN (For primary document see N83-32709 21-01)
Avail: NTIS HC A10/MF A01

The fatigue resistance of welded aluminum cast alloy samples was tested and the welding of airframe components was investigated. Electron beam and tungsten-inert gas welding were used. Static and dynamic fatigue resistance values are presented for samples made of aluminum Precial-cast alloys A357 and Avior A. Optimization tests on welded components show that they can be economically utilized in airframe construction. Author (ESA)

N83-32716# Vereinigte Flugtechnische Werke G.m.b.H., Bremen (West Germany). Metallische Werkstoffe.
SUPERPLASTIC TRANSFORMATION AND DIFFUSION WELDING OF TITANIUM ALLOYS [SUPERPLASTISCHES UNFORMEN/DIFFUSIONSSCHWEISSEN VON TILEGIERUNGEN] c26
W. Beck, K. F. Sahm, and P. J. Winkler *In its* Develop. and Demonstration of Econ. Production Systems in Airframe Construct. Sep. 1982 p 159-188 In GERMAN (For primary document see N83-32709 21-01)
Avail: NTIS HC A10/MF A01

A propeller rib was manufactured as airframe component specimen in order to study construction details, manufacturing parameters and cost data of the Superplastic Forming/Diffusion Ion Bonding (SPFIDB) technology. The inner structure was investigated with X-rays. The use of titanium is justified by the presence of high thermal and mechanical loads. The manufacturing parameters transformation temperature, transformation velocity and pressure-time evolution are optimized. Special tools are developed for the manufacturing. Expansion of electron beam welded from sheets and argon pressure transformation of sheet titanium were applied. Computer aided evaluation optimizes hot-drawing tests for the qualification of the starting material with a view to superelastic transformation characteristics. Author (ESA)

N83-32717# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ACTA AERONAUTICA ET ASTRONAUTICA SINICA
4 Mar. 1983 166 p refs Transl. into ENGLISH of Hang Kong Xuebao (China), v. 3, no. 3, Sep. 1982 p 1-105
(AD-A127840; FTD-ID(RS)T-1605-82) Avail: NTIS HC A08/MF A01 CSCL 20/4

Several areas of aerodynamic stability were addressed including aircraft flutter, computer techniques, electronic circuit analysis, vibration, Kalman filters, and relaxation computation of transonic flows. For individual titles, see N83-32718 through N83-32726.

N83-32718# Air Force Systems Command, Wright-Patterson AFB, Ohio.
RELAXATION COMPUTATION OF TRANSONIC FLOWS AROUND WINGS WITH BLUNT LEADING-EDGE AND DISCUSSION ON ITS STABILITY AND CONVERGENCE c02
Zheng Yuwen and Luo Shijun *In its* Acta Aeron. et Astronautica Sinica (FTD-ID(RS)T-1605-82) 4 Mar. 1983 p 1-21 refs Transl. into ENGLISH from Hang Kong Xuebao (China), v. 3, no. 3, Sep. 1982 p 1-12 (For primary document see N83-32717 21-01)
Avail: NTIS HC A08/MF A01 CSCL 01/1

The exact velocity potential equation and the exact boundary conditions were used around the blunt leading edge of a wing, and the velocity potential equation with small perturbation in the transverse direction and large perturbation in the longitudinal direction together with its corresponding boundary conditions were used in other areas to obtain the solution. The stability conditions of the linear relaxation with improving iteration of the transonic velocity potential difference equation with small steady perturbation under the assumption of local linearization, and the conditions for the convergence of the relaxation solution to the original differential equation solution were established. Author

N83-32719# Air Force Systems Command, Wright-Patterson AFB, Ohio.
DETERMINATION OF AERODYNAMIC COEFFICIENTS FOR A RE-ENTRY BODY BY MEANS OF AN EXTENDED KALMAN FILTER c02
Jiang Quanwei, Xu Jinzhi, and Zhou Shuying *In its* Acta Aeron. et Astronautica Sinica (FTD-ID(RS)T-1605-82 4 Mar. 1983 p 22-39 refs Transl. into ENGLISH from Hang Kong Xuebao (China), v. 3, no. 3, Sep. 1982 p 15-22 (For primary document see N83-32717 21-01)
Avail: NTIS HC A08/MF A01 CSCL 01/1

An extended Kalman filter method was used to determine the major aerodynamic coefficients of reentry bodies. The emphasis was placed on estimating states and parameters using the measured data during the reentry flight under the condition that trajectory observation data was absent. The data included body axial angular rate and acceleration obtained from the rate gyros and accelerameters. A mathematical model was established based on six degree of freedom motion equations. Both ballistic and maneuvering reentries were considered. Numerical simulation and actual measurement conversion showed that the present method provided more satisfactory results. Author

N83-32720# Air Force Systems Command, Wright-Patterson AFB, Ohio.

A PROGRAM SYSTEM FOR DYNAMIC ANALYSIS OF AERONAUTICAL STRUCTURES, HAJIF-II TEAM FOR DEVELOPING HAJIF-II **c08**

Guan Dd *In its* Acta Aeron. et Astronautica Sinica (FTD-ID(RS)T-1605-82) 4 Mar. 1983 p 40-54a refs Transl. into ENGLISH from Hang Kong Xuebao (China), v. 3, no. 3, Sep. 1982 p 25-31 (For primary document see N83-32717 21-01)

Avail: NTIS HC A08/MF A01 CSCL 01/3

HAJIF-II is the dynamic analysis system for aeronautical structures. The calculation of natural dynamic characteristics of structures as well as the calculation of aircraft flutter with an active control system and the calculation of gust response are computed. It has 31 fixed flow routes and 2600 FORTRAN statements. It allows the use of 99 elementary substructures and each substructure has 7000 degrees of freedom. In the flutter and gust response computation, it is possible to use 50 modes. The panel number in nonsteady aerodynamic calculation reaches 300. In the management of the stiffness matrix and mass matrix, the hypermatrix method is used for "macroscopic treatment" and the effective column method is used for "microscopic treatment" to develop a new simultaneous iteration algorithm to improve the efficiency of the calculation of real characteristic values. A more complete state synthesis method computation program was designed. Author

N83-32721# Air Force Systems Command, Wright-Patterson AFB, Ohio.

SYSTEM IDENTIFICATION AND AIRCRAFT FLUTTER **c08**

Zhang Lingmi *In its* Acta Aeron. et Astronautica Sinica (FTD-ID(RS)T-1605-82) 4 Mar. 1983 p 55-68a refs Transl. into ENGLISH from Hang Kong Xuebao (China), v. 3, no. 3, Sep. 1982 p 33-40 (For primary document see N83-32717 21-01)

Avail: NTIS HC A08/MF A01 CSCL 01/3

After briefly describing the application of system identification technique to the study of aircraft flutter, three types of system identification methods are introduced. The emphasis was placed on the essence of the algorithm and its theoretical basis. The relevant data processing problem was also properly explained. The transfer function method, based on complex modal analysis and the optimization technique, could accurately identify all the modal parameters. It was successfully used in the flutter model experiment of a wing with external bodies. This method could be extended to the conditions for wind tunnel and flight tests with response data only. The correlation and least square techniques were adopted in the impulse response and auto-regressive moving average model method in order to obtain accurate results under strong interference. The latter could also obtain the mean square deviation between the estimated value and the actual value. Both time domain methods could directly use measured sampling data to perform system identification without special signal analysis equipment. Author

N83-32722# Air Force Systems Command, Wright-Patterson AFB, Ohio.

APPLICATION OF MULTIPLE DYNAMIC ABSORBERS TO REDUCE THE VIBRATION LEVEL OF A COMPLEX CANTILEVER STRUCTURE **c39**

Tian Qianli *In its* Acta Aeron. et Aeronautica Sinica (FTD-ID(RS)T-1605-82) 4 Mar. 1983 p 69-79 refs Transl. into ENGLISH from Hang Kong Xuebao (China), v. 3, no. 3, Sep. 1982 p 42-47 (For primary document see N83-32717 21-01)

Avail: NTIS HC A08/MF A01 CSCL 20/11

A complex cantilever structure has two closely positioned resonance peaks near 20 Hz causing the destruction of the root of the structure. A method to use multiple dynamic absorbers to reduce its vibration level is presented. In order to overcome the drawback of the usual tuned absorbers which are very sensitive to the structural frequency, six absorbers were hung in a given section of the structure. The absorbers can vibrate along any direction with the structure. Futhermore, the stiffness and damping parameters of these six absorbers is different from one another so that the absorbing frequency range is widened. In order to find the optimum parameters and to study the effect of parameter variation on the structure response, large amounts of response curves were calculated. Because the structural damping is very small and the absorber damping is large, therefore, it is a non-proportional damping dynamic analysis problem. This problem was solved by an eigen solution method and a modal synthesis method. Author

N83-32723# Air Force Systems Command, Wright-Patterson AFB, Ohio.

A SPECTRAL APPROACH FOR ANALYZING THE VIBRATION OF A PERIODIC STRUCTURE WITH RANDOM PARAMETERS **c39**

Huang Wen Hu *In its* Acta Aeron. et Astronautica Sinica (FTD-ID(RS)T-1605-82) 4 Mar. 1983 p 80-97a refs Transl. into ENGLISH from Hang Kong Xuebao (China), v. 3, no. 3, Sep. 1982 p 50-60 (For primary document see N83-32717 21-01)

Avail: NTIS HC A08/MF A01 CSCL 20/11

In order to explore the effect of fabrication deviation of the blades in a circumferentially closed turbine blade assembly on the vibration of the turbine blades, a structure model with periodic random parameters as an approximation of the blade structure was used. In addition, a spectral method was presented to analyze the vibration of this structure. Assuming the standard deviations of the structural parameters are small, therefore, it is possible to use a perturbation method. The periodic random structural parameters are expanded into Fourier series, so that the free vibration and forced vibration of the structure can be solved. Then, the frequency, vibration mode, resonance amplitude and square deviation estimate can be obtained. The orthogonality of the main vibration modes were proven. The special conditions for resonance of this structure were analyzed. The examples showed that the analyzed results and experimental results have the same order of magnitude. Author

N83-32724# Air Force Systems Command, Wright-Patterson AFB, Ohio.

ELECTRONIC CIRCUIT ANALYSIS LANGUAGE (ECAL) **c33**

Chen Chenghang *In its* Acta Aeron. et Astronautica Sinica (FTD-ID(RS)T-1605-82) 4 Mar. 1983 p 127-137a refs Transl. into ENGLISH from Hang Kong Xuebao (China), v. 3, no. 3, Sep. 1982 p 81-87 (For primary document see N83-32717 21-01)

Avail: NTIS HC A08/MF A01 CSCL 09/3

The computer aided design technique is an important development in computer applications and it is an important component of computer science. The special language for electronic circuit analysis is the foundation of computer aided design or computer aided circuit analysis (abbreviated as CACD and CACA) of simulated circuits. Electronic circuit analysis language (ECAL) is a comparatively simple and easy to use circuit analysis special language which uses the FORTRAN language to carry out the explanatory executions. It is capable of conducting dc analysis, ac analysis, and transient analysis of a circuit. Futhermore, the results of the dc analysis can be used directly as the initial conditions for the ac and transient analyses. Author

N83-32725# Air Force Systems Command, Wright-Patterson AFB, Ohio.

AN EXPERIMENTAL INTERACTIVE COMPUTER GRAPHICS SYSTEM FOR FREE-FORM SURFACE DESIGN **c61**

Zheng Huiling, Wang Zhisheng, Lu Hongjia, and He Tianbao *In its* Acta Aeron. et Astronautica Sinica (FTD-ID(RS)T-1605-82) 4 Mar. 1983 p 138-150a refs Transl. into ENGLISH from Hang Kong Xuebao (China), v. 3, no. 3, Sep. 1982 p 88-95 (For primary document see N83-32717 21-01)

Avail: NTIS HC A08/MF A01 CSCL 09/2

An interactive graphics system for free form surface design is introduced. The system was established on the basis of the cubic uniform B-spline theory. In order to obtain better simulated results, the basic function with a quadruple knot at both ends was chosen. The three dimensional model is displayed on a screen or a plotter and allows the three dimensional coordinate system to undergo real time transformation with respect to the model. Through the use of a method involving the fairing of the curvatures of discrete

points sequentially, the external shape of the model is faired. Two local modification methods for the model surface are provided. The display of any arbitrary cross-section of the model is permitted. A computer aided shape design interactive system was established using a DJS-6 computer and a model "751" optical pen graphics display. Author

N83-32726# Air Force Systems Command, Wright-Patterson AFB, Ohio.

BEZIER PLOTTING THEOREM AND GEOMETRIC CHARACTERISTICS OF CUBIC BEZIER CURVES **c64**

Shi Fazhong and Wu Junheng *In its* Acta Aeron. et Astronautica Sinica (FTD-ID(RS)T-1605-82) 4 Mar. 1983 p 151-161 refs Transl. into ENGLISH from Hang Kong Xuebao (China), v. 3, no. 3, Sep. 1982 p 97-104 (For primary document see N83-32717 21-01)
Avail: NTIS HC A08/MF A01 CSCL 12/1

The geometric characteristics of the Bezier curve were studied in depth by P. E. Bezier using the fast end curve and by Su Boqing and Liu Dengyuan using simulated projection transformation. The method presented by Bezier to find the points and their tangents on the Bezier curve using geometric plotting is the Bezier plotting theorem. The geometric characteristics of plane cubic Bezier curves based on the plotting theorem are analyzed. Author

N83-32727# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ACTA AERONAUTICA ET ASTRONAUTICA SINICA

4 Mar. 1983 223 p refs Transl. into ENGLISH of Hang Kong Xuebao (China), v. 2, no. 1, 1981 p 1-103
(AD-A127983; FTD-ID(RS)T-0664-82) Avail: NTIS HC A10/MF A01 CSCL 20/4

Developments and progress in aerospace technology are reported. Topics discussed include: second order theory for three dimensional supersonic and low hypersonic unsteady flow around a thin wing; wind tunnel tests; solving of the two dimensional cascade flow field with free streamline boundaries; turbojet engine tests; jet engine ignition of fuel sprays; development of an astro inertial hybrid navigation system and star tracker; monopulse technique in airborne radar; mechanism of stress corrosion cracking and hydrogen induced cracking. For individual titles, see N83-32728 through N83-32737.

N83-32728# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ACCURACY AND APPLICATION OF A SECOND-ORDER THEORY FOR THREE-DIMENSIONAL SUPERSONIC AND LOW HYPERSONIC UNSTEADY FLOWS AROUND A THIN WING **c02**

Qian Fuxing (Academia Sinica), Gu Weikai (Academia Sinica), and He Longde (Academia Sinica) *In its* Acta Aeron. et Astronautica Sinica (FTD-ID(RS)T-0664-82) 4 Mar. 1983 p 1-16 refs Transl. into ENGLISH from Hang Kong Xuebao (China), v. 2, no. 1, 1981 16 p (For primary document see N83-32727 21-01)
Avail: NTIS HC A10/MF A01 CSCL 01/1

The problem of three dimensional supersonic unsteady flows around a thin wing utilizes the PLK method so that the second order solution is uniformly effective is discussed. An unsteady small disturbed flow a magnitude higher is superposed on a known steady flow around a body and it is linearized. This method uses high Mach number approximations to reduce the unsteady second order equation. Its form is similar to that of a steady second order equation. The special solution is the key to solving the equation. A type of special approximation solution was used. The method is suitable for the Mach number range between most supersonic and completely hypersonic velocities. The reduced frequency can reach to about 1. The influence of the thickness and initial angle of attack on the unsteady aerodynamic force and moment of force is estimated. E.A.K.

N83-32729# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

EXPERIMENTAL INVESTIGATION OF INTERFERENCES OF TOP AND BOTTOM SLOTTED WALLS AND THE EFFECTS OF SIDEWALLS IN A TRANSONIC AIRFOIL WIND TUNNEL **c09**

In its Acta Aeron. et Astronautica Sinica (FTD-ID(RS)T-0664-82) 4 Mar. 1983 p 17-37 refs Transl. into ENGLISH from Hang Kong Xuebao (China), v. 2, no. 1, 1981 21 p (For primary document see N83-32727 21-01)
Avail: NTIS HC A10/MF A01 CSCL 14/2

Pressure distribution on three RAE 104 airfoil models were measured in transonic airfoil wind tunnel. It is shown that when the open area ratio is 2%, the blockage interference of the wind tunnel practically vanishes. It is shown that under the three sidewall conditions of solid sidewalls, multilayered mesh plates without air exhaust and multilayered mesh plates with air exhaust: multilayered mesh plates without air exhaust cause the lift coefficients to be much lower than the values when there is no interference; when $M < 0.7$, use of a solid sidewall causes the lift coefficients to reach the values when there is not interference; installment of a multilayered mesh plate with air exhaust can also cause the lift coefficients to reach the values when there is no interference. Test results in this wind tunnel and those in the British NPL's 20 inch x 8 inch transonic tunnel are compared. E.A.K.

N83-32730# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

THE BIPARAMETRIC CYCLE COUNT METHOD AND THE PRINCIPLE OF SIMPLIFICATION **c39**

Jiang Zuguo *In its* Acta Aeron. et Astronautica Sinica (FTD-ID(RS)T-0664-82) 4 Mar. 1983 p 38-69 refs Transl. into ENGLISH from Hang Kong Xuebao (China), v. 2, no. 1, 1981 22 p (For primary document see N83-32727 21-01)
Avail: NTIS HC A10/MF A01 CSCL 20/11

Working out the load spectrum which plays an important part in determining the fatigue life of the aircraft structure is discussed. Selection of the counting method and determination of the principle of simplification are two outstanding problems in drawing up the operational load spectrum of a fighter. This method corresponds to the stress strain delaying loop and gives real expression to fatigue loads sustained on the aircraft; it is a simplification principle of invariable mean value. The simplification principle of the variable mean value and a two wave method is proposed. A typical random load mechanism of a fighter for 50 flight hours is presented. Two counting methods and four simplification principles for load spectra calculations, and corresponding life estimations were completed. The contrast tests in groups for the six different load spectra were carried out. It is confirmed that the theoretical analysis is useful for working out the load spectrum of the fighter with the counting method and the principle of simplification. E.A.K.

N83-32731# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

A FINITE ELEMENT METHOD FOR LOCAL STABILITY OF A STIFFENED PANEL IN AXIAL COMPRESSION **c39**

Liu Dongchang (Aircraft Strength Inst.) *In its* Acta Aeron. et Astronautica Sinica (FTD-ID(RS)T-0664-82) 4 Mar. 1983 p 70-93 refs Transl. into ENGLISH from Hang Kong Xuebao (China), v. 2, no. 1, 1981 24 p (For primary document see N83-32727 21-01)
Avail: NTIS HC A10/MF A01 CSCL 20/11

The problem of using a finite element method for local stability of a stiffened panel in axial compression was examined. Proceeding from the symmetry analysis for the mode of buckling deformation, a local unit computation model is proposed. The limitations of the typical unit computation model are pointed out for the structures with unsymmetric modes of buckling deformation. The universal adaptability of the local unit in stability calculations was determined. The assumption of simplification or the attachment of covering and stiffness was analyzed for the river joint structure. The computation model for the river joint structure was improved and the rationality of the computation results was ensured. The principles for simplifying the computation model are discussed. Further simplication of the computation model are carried out and saving on computer internal storage and raising throughput speed. Computation curves, test results, and the moment distribution method are analyzed. E.A.K.

N83-32732# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
A UNIVERSAL METHOD FOR SOLVING THE TWO-DIMENSIONAL CASCADE WITH FREE STREAMLINE BOUNDARIES **c02**
Chen Jingyi (Academia Sinica) *In its* Acta Aeron. et Astronautica Sinica (FTD-ID(RS)T-0664-82) 4 Mar. 1983 p 94-112 refs Transl. into ENGLISH from Hang Kong Xuebao (China), v. 2, no. 1, 1981 29 p (For primary document see N83-32727 21-01)
Avail: NTIS HC A10/MF A01 CSCL 01/1

A new solution method of two dimensional cascade in which the free streamline boundary conditions can be satisfied is proposed. This is a cross iterative calculation method between two correlated flow fields. The two dimensional subsonic flow field problem for calculating the upstream and downstream regions of the ordinary cascade, the splitter blade cascade and the tandem cascade is discussed. The computer program can be used for these three cases. A physical condition of minimum disturbance of the flow field to calculate the splitter blade cascades and tandem cascades to calculate the rate of flow distribution ratio of the two blade channels formed by the splitter blade or the splitter stream surface is proposed. E.A.K.

N83-32733# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
TESTS FOR INLET DISTORTION IN A TWO-SPOOL TURBOJET ENGINE ON THE GROUND TEST BED **c07**
Jiang Feng (Shenyang Liming Machinery Co.) *In its* Acta Aeron. et Astronautica Sinica (FTD-ID(RS)T-0664-82) 4 Mar. 1983 p 113-133 refs Transl. into ENGLISH from Hang Kong Xuebao (China), v. 2, no. 1, 1981 21 p (For primary document see N83-32727 21-01)
Avail: NTIS HC A10/MF A01 CSCL 21/5

The effects of the inlet total pressure distortion on the performance and stability of a two spool turbojet engine with a three stage low pressure compressor and three stage high pressure compressor, a medium supercharging ratio and afterburning. The steady state circumferential pressure distortion is created by the 90 deg fan shaped mesh. The relational curve of the mesh with different blockage ratios or distortion amplitude produced by the congruent mesh which follows the engine's inlet rate of flow is determined. E.A.K

N83-32734# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
FUNDAMENTAL INVESTIGATION OF JET ENGINE IGNITION OF FUEL SPRAYS AND ITS APPLICATION **c28**
Chen Ningkun (Peking Inst. of Aeronautics and Astronautics) *In its* Acta Aeron. et Astronautica Sinica (FTD-ID(RS)T-0664-82) 4 Mar. 1983 p 134-148 refs Transl. into ENGLISH from Hang Kong Xuebao (China), v. 2, no. 1, 1981 15 p (For primary document see N83-32727 21-12)
Avail: NTIS HC A10/MF A01 CSCL 21/4

Jet engine ignition of fuel sprays, was investigated. It is found that the present store energy in high energy ignition equipment should not be further increased. It is suggested that effective approaches to improve ignition performance are improvement of the quality of fuel sprays, to sustain optimal spark time, to keep the electric pole distance a little more than the quenching distance and to heat the starting fuel. E.A.K.

N83-32735# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
DEVELOPMENT OF AN ASTRO-INERTIAL HYBRID NAVIGATION SYSTEM AND A STAR TRACKER **c04**
Shen Gongxun, Qin Shiguang, Chang Qingzhi, and Zhou Danian *In its* Acta Aeron. et Astronautica Sinica (FTD-ID(RS)T-0664-82) 4 Mar. 1983 p 149-174 refs Transl. into ENGLISH from Hang Kong Xuebao (China), v. 2, no. 1, 1981 26 p (For primary document see N83-32727 21-01)
Avail: NTIS HC A10/MF A01 CSCL 17/7

An astro inertial hybrid navigation system which is physically more rational and accurate and has come into particular use in various modern flight vehicles is presented. In astronavigation, a star tracker is an essential facility to obtain the measurement information of this hybrid system. The research and design methods of China's first domestically designed automatic star tracker to solve the principal technical key problems are summarized and related formulas are presented. It is shown that the design is reasonable and has attained the expected performance indices which allows the designed star tracker on the ground the ability of tracking stars with brightness above second class at night and the brightest stars under the background of certain brightness in daytime. E.A.K.

N83-32736# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
MONOPULSE TECHNIQUE IN AIRBORNE RADAR **c32**
Ji Jie (Airborne Radar Inst.) *In its* Acta Aeron. et Astronautica Sinica (FTD-ID(RS)T-0664-82) 4 Mar. 1983 p 174-195 refs Transl. into ENGLISH from Hang Kong Xuebao (China), v. 2, no. 1, 1981 22 p (For primary document see N83-32727 21-01)
Avail: NTIS HC A10/MF A01 CSCL 17/5

The monopulse technique in airborne radar was investigated. The key technique of the amplitude comparison system and related data are discussed. The monopulse technique is viewed for antiinterference performance and particular applications. These applications, which include air to ground range finding, improvement of angular resolution and terrain avoidance are expounded on. E.A.K.

N83-32737# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
MECHANISM OF STRESS CORROSION AND HYDROGEN INDUCED CRACKING **c26**
Zhu Wuyang, Li Shiqiong, Xiao Jimei, and Zhu Shuyan *In its* Acta Aeron. et Astronautica Sinica (FTD-ID(RS)T-0664-82) 4 Mar. 1983 p 196-214 refs Transl. into ENGLISH from Hang Kong Xuebao (China), v. 2, no. 1, 1981 19 p (For primary document see N83-32727 21-01)
Avail: NTIS HC A10/MF A01 CSCL 11/6

The production and expansion of stress corrosion cracking and hydrogen induced cracking was observed in various hydrogenate environments for four types of low alloy steel with different strengths using polished constant displacement specimens. It is shown that after the strength of steel and K sub I are larger than a critical value, hydrogen induced delayed plastic deformation can be produced in any hydrogenate environment, following the diffusion entrance of the atomic hydrogen the plastic zone and its deformation degree on the front end of the original crack enlarged continuously. When the hydrogen induced delayed plastic deformation develops to a critical condition, this causes the nucleation and expansion of the hydrogen induced delayed cracking. E.A.K.

N83-32738# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
MECHANICS AND PRACTICE (SELECTED ARTICLES)
28 Mar. 1983 45 p refs Transl. into ENGLISH from Lixue yu Shijian (China), v. 4, no. 3, 1982 p 19-23, 39-43 and 78-81 (AD-A128353; FTD-ID(RS)T-0016-83) Avail: NTIS HC A03/MF A01 CSCL 20/4

Environmental wind tunnel design, aerodynamic computation of the wing-body-short cabin composite, and the 'optical oil flow' technique in a shock wave wind tunnel are considered. For individual titles, see N83-32739 through N83-32741.

N83-32739# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SEVERAL PROBLEMS IN THE DESIGN OF ENVIRONMENTAL WIND TUNNELS **c09**
Fu Zhifu *In its* Mech. and Practice (Selected Articles) 28 Mar. 1983 p 1-14 Transl. into ENGLISH from Lixue yu Shijian (China), v. 4, no. 3, 1982 p 19-23 (For primary document see N83-32738 21-01)
Avail: NTIS HC A03/MF A01 CSCL 14/2

Characteristics of an environmental wind tunnel are discussed. Design problems are also discussed. Author

N83-32740# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
AERODYNAMIC COMPUTATION OF THE WING-BODY-SHORT CABIN COMPOSITE **c02**
Chen Yao Song *In its* Mech. and Practice (Selected Articles) 28 Mar. 1983 p 15-25 refs Transl. into ENGLISH from Lixue yu Shijian (China), v. 4, no. 3, 1982 p 39-43 (For primary document see N83-32738 21-01)
Avail: NTIS HC A03/MF A01 CSCL 01/1

Extraction of aerodynamic perturbation and the decomposition of the boundary condition and the computational sequence are discussed. Author

N83-32741# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE OPTICAL OIL FLOW TECHNIQUE IN A SHOCK WAVE WIND TUNNEL **c09**
Yang Zuqing and Wang Xirong *In its* Mech. and Practice (Selected Articles) 28 Mar. 1983 p 26-27 Transl. into ENGLISH from Lixue yu Shijian (China), v. 4, no. 3, 1982 p 78-81 (For primary document see N83-32738 21-01)
Avail: NTIS HC A03/MF A01 CSCL 14/2

The experimental model is a plate-cylinder composite body. The body was installed on the symmetry plane in the test section in an attitude approximately perpendicular to the horizontal plane. The M number of the flow at the outlet of the nozzle is close to 8. It could also ensure the presence of a turbulent surface layer on the plate in front of the cylinder. The experimental time period is approximately 7 milliseconds. Clear flow pattern photographs related to the supersonic turbulent surface layer separation in front and behind the cylinder were obtained. Author

N83-32742# Societe Nationale Industrielle Aerospatiale, Paris (France).
AEROSPACE INDUSTRY MATERIALS: CHOICE CRITERIA AND NEEDS TO BE MET
Jacques Balazard 16 Dec. 1982 17 p In FRENCH Presented at Intern. Colloq. on Mater., Energie, Aspects Previsionnels pour la Rech. et l'Ind., Sophia-Antipolis, France, 20-21 Jan. 1983 (SNIAS-831-502-101; DCT-677/82) Avail: NTIS HC A02/MF A01

Raw material, design, production, life cycle, operating and maintenance costs of aerospace industry raw materials are discussed. It is suggested that the economic consequences of technical choices determine whether composite or metal materials are used. Author (ESA)

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N83-32743 California Univ., Berkeley.
AN EXPERIMENTAL INVESTIGATION OF THREE-DIMENSIONAL BOUNDARY LAYER SEPARATION IN SUPERSONIC FLOW PAST A CIRCULAR CYLINDER ON A FLAT PLATE Ph.D. Thesis
Oktay Ozcan 1982 129 p
Avail: Univ. Microfilms Order No. DA8300615

An experimental investigation of three dimensional boundary layer separation on a flat plate ahead of a circular cylinder around Mach 2.36 was made. Interchangable cylinders were mounted vertically on a flat plate which spanned the test section. The heights of the cylinders were larger than the undisturbed boundary layer thickness at the cylinder location. The laminar flow regime was of particular interest. Limited data for transitional and turbulent flow regimes were also obtained. Oil flow visualization was employed to determine the global structure of the flow and to correlate the separation distances with the cylinder dimensions and the test conditions. In laminar flow, static pressure measurements were made for various cylinders on the centerline of the flat plate. Detailed velocity and static pressure measurements were made for a particular cylinder in laminar flow regime. Streamwise and vertical velocities were measured by a single-component, forward scatter, differential (dual) beam LDV system. Dissert. Abstr.

N83-32744 Virginia Univ., Charlottesville.
JET SCALING EFFECTS IN A USB PROPULSIVE LIFT CONFIGURATION Ph.D. Thesis
William Webb Herling 1982 302 p
Avail: Univ. Microfilms Order No. DA8301471

Recent interest in short takeoff and landing (STOL) aircraft has prompted an investigation of scaling laws for the prediction of fluctuating surface pressures due to impinging jet flows, which is reported here. Pressure statistics in upper-surface-blown (USB) jet flows from a 1/4-scale model are compared for several Mach numbers and impingement conditions with full scale measurements from a NASA Langley installation, which consisted of a JT15D dual-flow, turbo-jet engine fitted with a rectangular nozzle exhausting internally mixed hot core and unheated bypass flow over a simulated wing with extended flap. The geometrically similar 1/4-scale model was configured to produce room temperature flows at low Mach numbers as a coaxial jet, simulating internal mixing processes, or as a single jet, representing a case of perfect mixing between internal engine flows. Overall fluctuating pressure levels when normalized by average exit plane dynamic pressure were found to be independent of Mach number and Reynolds number for the perfect mixing model. Dissert. Abstr.

N83-32745 Wichita State Univ., Kans.
ANALYSIS OF INCOMPRESSIBLE SEPARATED FLOW AROUND AN AIRFOIL WITH A FINITE-GAP FLAP Ph.D. Thesis
Rangasamy Elangovan 1982 149 p
Avail: Univ. Microfilms Order No. DA8300757

A computer model was developed to simulate subsonic incompressible flow around an airfoil with a finite gap flap. Experimental data was used for comparison throughout the development of the computer code. The computer model consists of two sections. The first section is the outer flow solution, which calculates the potential flow around an effective body with or without a closed wake. This body is formed by adding the boundary layer displacement thickness to the original airfoil and flap, and a closed wake if the flow separates on the airfoil or flap. The second section is the inner flow solution. This section uses a turbulent jet mixing analysis to simulate the flow bounding the wake and conserves mass and momentum within the wake. The inner and outer solutions are computed iteratively until they match. Results obtained from the computer program were compared with the experimental results. Dissert. Abstr.

N83-32746 Ohio State Univ., Columbus.
TRANSONIC INTERFERENCE EFFECTS IN TESTING OF OSCILLATING AIRFOILS Ph.D. Thesis
James Albert Davis 1982 340 p
Avail: Univ. Microfilms Order No. DA8300235

Transonic testing of NACA 64A010 airfoil models was conducted. The experimental results of both fixed angle of attack and mid chord pitch oscillation testing conducted in 132 sq in transonic airfoil tunnel are reported. Comparisons with both steady state and unsteady airfoil predictions were made along with other experimental data. The validity of the experimental setup was examined in light of unsteady interference effects at transonic speeds. Noise surveys conducted at the start indicated no resonant edgetones for the perforated wind tunnel walls in the 0 to 120 Hz range of pitch oscillations examined. Broadband noise levels were greatest low Mach 0.5 and above. Predicted tunnel resonance modes were at frequencies greater than the model pitch frequencies tested. Unsteady data was examined for indications of

tunnel resonance. Model and tunnel wall pressures showed that acoustic reflections were relatively weak and nonresonant with moderate attenuation at the porous-walls. Dissert. Abstr.

N83-32747 ESDU International Ltd., London (England).
AVERAGE DOWNWASH AT THE TAILPLANE AT LOW ANGLES OF ATTACK AND SUBSONIC SPEEDS; AMENDMENT A
Oct. 1981 23 p refs Supersedes Aero-A.08.01.02;Aero-A.08.01.03;Aero-A.08.01.04 Sponsored by the Royal Aeronautical Society
(ESDU-80020-Amend-A; Aero-A.08.01.02; Aero-A.08.01.03; Aero-A.08.01.04; ISBN-0-85679-303-5; ISSN-0141-397X) Avail: ESDU

This Data Item is an addition to the Aerodynamic Subseries. A simple method is described for estimating the average downwash angle at the tailplane for subsonic speeds and low angles of attack where the lift, pitching moment and downwash characteristics are linear, i.e. where the flow is wholly attached. The method, which is semi-empirical, is a first order one allowing for the major effects of wing planform, body, wing-body interference and tailplane height. Moderate amounts of wing twist are also catered for. The method applies only to wing-body-tail combinations although some assessment of the effect of rear-fuselage mounted nacelles is given. ESDU

N83-32748 ESDU International Ltd., London (England).
PRESSURE DRAG OF BLUNT FOREBODIES AT ZERO INCIDENCE FOR MACH NUMBERS UP TO 4
Sep. 1980 13 p refs Supersedes AERO-BS-02-03-06 Sponsored in part by the Royal Aeronautical Society
(ESDU-80021; AERO-BS-02-03-06; ISBN-0-85679-304-3; ISSN-0141-397X) Avail: ESDU

This Data Item is an addition to the Aerodynamics Subseries. Data for the pressure drag component of the forebody drag for families of ellipsoidal, tangent ogive, spherically-blunted tangent ogive and flat-faced forebodies with and without a radiused shoulder are given. Axially-symmetric forebodies at zero incidence are discussed, as well as both subsonic and supersonic speed ranges up to Mach 4. The data, which are presented in graphical form, were obtained from correlations of experimental data and theoretical calculations for inviscid airflow. ESDU

N83-32749 ESDU International Ltd., London (England).
BLOCKAGE CORRECTIONS FOR BLUFF BODIES IN CONFINED FLOWS
Nov. 1980 4 p refs Sponsored by Institution of Structural Engineers
(ESDU-80024; ISBN-0-85679-307-8; ISSN-0141-4003) Avail: ESDU

This Data Item is an addition to the Aerodynamics Subseries and to the Wind Engineering Subseries. Information about the effects of blockage on the forces and pressures on, and flow around, bluff and quasi-streamlined bodies in two and three dimensional flows confined by straight, solid wall boundaries are provided. The data apply to blockage up to about 20 per cent of area. Sources of information are also given for open jet wind tunnels where blockage corrections are equally important. A description is given of the effects of blockage on bodies of all shapes and recommended correction methods are given for mean force and pressure measurements together with tabulated data needed to apply the methods to a range of body shapes. The reference flow properties appropriate to both uniform and shear flows are considered. The data include guidance on the application of blockage corrections to estimating forces on and pressure drop across, bodies in ducts. Appendices give further background information on the methods recommended, sketch out less important bluff body blockage corrections and discuss practical problems of wind tunnel testing for blockage effects. ESDU

N83-32750 ESDU International Ltd., London (England).
MEAN FORCES, PRESSURES AND FLOW FIELD VELOCITIES FOR CIRCULAR CYLINDRICAL STRUCTURES: SINGLE CYLINDER WITH TWO-DIMENSIONAL FLOW, AMENDMENTS A AND B
Oct. 1980 55 p refs Supersedes ESDU-70013 Sponsored in part by the Royal Aeronautical Society and Institution of Structural Engineers
(ESDU-80025-Amend-A/B; ESDU-70013; ISBN-0-85679-308-6; ISSN-0141-4003; ISSN-0141-397X) Avail: ESDU

This Data Item is an addition to the Aerodynamics Subseries and to the Wind Engineering Subseries. Data for estimating the mean forces and pressures induced by flow normal or inclined to a cylindrical structure of circular cross-section are given. The data apply when the effect of the flow around the free end (or ends) is ignored (i.e. for two dimensional flow) ESDU 81017 provides additional information in the form of correction factors which are applied to these data to account for end effects and shear flow effects, such as those associated with cantilever structures in the nonuniform atmospheric wind. Drag coefficients are given as a function of Reynolds number (.01 to 10 to the 7th power), the turbulence properties of the oncoming flow and surface roughness for which guidance is given on typical values. The effects of spanwise protrusions and other nearby plane surfaces are quantified as are the effects of perforations and helical strakes. Data are provided in equation form, giving both mean and fluctuating surface pressure distributions and the mean velocity flow field for cylinders with a smooth or rough surface at Reynolds number between about .00001 and 10 to the 7th power. Calculation sheets are provided to summarize the step by step estimation procedures. ESDU

N83-32751 ESDU International Ltd., London (England).
CONTRIBUTION OF WING PLANFORM TO ROLLING MOMENT DERIVATIVE DUE TO SIDESLIP, (L SUB V) SUB W, AT SUBSONIC SPEEDS
Oct. 1981 12 p refs Supersedes Aero-A.06.01.04
(ESDU-80033; Aero-A.06.01.04; ISBN-0-85679-316-7; ISSN-0141-397X) Avail: ESDU

This Data Item is an addition to the Aerodynamics Subseries. A semi-empirical method is described for predicting the planform contribution to L sub V for aircraft having wings on any trapezoidal planform with aspect ratio between 1 and 12, tip chord/root chord ratio between 0 and 1 and sweepback of the mid-chord line between 0 and 60 degrees. The formulae given apply also to swept forward wings for which case reference is given to theoretical data on the spanwise position of the center of pressure, which is needed to evaluate the formula. The method takes account of the effect of wing sweep on a theoretical basis and this is used to establish the zero-sweep contribution empirically from a large number of wind-tunnel test data. Compressibility effects are taken into account up to the Mach number at which aerodynamic characteristics start to change rapidly. A worked example on the use of the data is included. ESDU

N83-32752 ESDU International Ltd., London (England).
EFFECT OF TRAILING-EDGE FLAPS ON ROLLING MOMENT DERIVATIVE DUE TO SIDESLIP, (L SUB V) SUB F
Nov. 1980 10 p refs
(ESDU-80034; ISBN-0-85679-317-5; ISSN-0141-397X) Avail: ESDU

This Data Item is an addition to the Aerodynamics Subseries. A semi-empirical method for predicting the change in rolling moment derivative due to sideslip that occurs when wing trailing edge flaps are deployed for landing or takeoff is presented. The method is applicable at incidences where there is a linear variation of rolling moment coefficient with angle of sideslip and of lift coefficient with angle of attack. The method covers wings of aspect ratios from 3 to 12 and half chord sweep angles from -10 deg to 45 deg with plain, split or slotted flaps. ESDU

N83-32753 ESDU International Ltd., London (England).
PRESSURE RECOVERY OF AXISYMMETRIC INTAKES AT SUBSONIC SPEEDS
Nov. 1980 29 p refs Sponsored by the Royal Aeronautical Society
(ESDU-80037; ISBN-0-85679-320-5; ISSN-0141-397X) Avail: ESDU

This Data Item is an addition to the Aerodynamic Subseries. A method is described for estimating the pressure recovery of axisymmetric intakes at subsonic speeds. The method is based on semi-empirical correlation of a wide range of experimental data including many unpublished results. The two main components of intake loss, associated with the lip and the diffuser portions of the intake, are considered separately. The data is provided to estimate values for each of these components, the interaction between them, and to determine other minor components of pressure loss arising from straight portions of intake between the lip and diffuser and between the diffuser and the engine entry. The effects of nacelle incidence, which can be taken to include sideslip in crosswind conditions, are taken into account. The data apply to axisymmetric intakes, such as those on pylon-mounted engine pods, with sharp or rounded lips and, with entry contraction ratios up to 1.4. ESDU

N83-32754 ESDU International Ltd., London (England).
MASS FOW AND MOMENTUM FUNCTIONS FOR ONE-DIMENSIONAL FLOW OF GAS IN DUCTS
Mar. 1981 19 p refs Sponsored in part by the Royal Aeronautical Soc.
(ESDU-81004; ISBN-0-85679-328-0; ISSN-0141-397X) Avail: ESDU

This Data Item is an addition to the Aerodynamics Subseries. Three Mach number dependent functions, the momentum function and alternative forms of the mass flow function, which are useful in many one dimensional duct flow problems are presented. The use of these functions is general since friction, area change, and heat exchange effects are simultaneously or separately accommodated. The functions are plotted against Mach number, for various values of gamma. These flow relationships may be applied to nonisentropic duct flow to evaluate local conditions provided that proper account is taken of any changes that may occur in total pressure and total temperatures along the duct. Information in ESDU 00.03.05 and 5.00.03.07, which give relations for steady one diminsional isentropic flow, may often be usefully applied in conjunction with ESDU 81004. ESDU

N83-32755 ESDU International Ltd., London (England).
EFFECT OF TRAILING-EDGE FLAPS ON SIDEFORCE AND YAWING MOMENT DERIVATIVES DUE TO SIDESLIP, (Y SUB V) SUB F AND (N SUB V) SUB F: AMENDMENT A
Jun. 1982 16 p refs Sponsored by Royal Aeronautical Society
(ESDU-81013-Amend-A; ISBN-0-85679-338-8; ISSN-0141-397X) Avail: ESDU

This Data Item is an addition to the Aerodynamics Subseries. A semi-empirical method for predicting (Y sub v) sub f and (N sub v) sub f the changes in sideforce and yawing moment derivatives due to sideslip which occur when wing trailing edge flaps are deployed for landing and takeoff are given. The method applies to wing-body-tail combinations (with or without nacelles) at low subsonic speeds provided that there is a linear variation of sideforce and yawing moment coefficients with sideslip and of lift coefficient with angle of attack. During the development of the method it was found that wind tunnel data showed that small changes in model geometry could result in significant changes in the magnitudes and the behavior with angle of attack of both (Y sub v) sub f (N sub v) sub f. ESDU

N83-32756 ESDU International Ltd., London (England).
CONTRIBUTION OF WING PLANFORM TO DERIVATIVES OF YAWING MOMENT AND SIDEFORCE DUE TO ROLL RATE AT SUBSONIC SPEEDS (N SUB P)SUB W AND (Y SUB P)SUB W
Jun. 1981 20 p refs Sponsored in part by the Royal Aeronautical Society
(ESDU-81014; ISBN-0-85679-339-6; ISSN-0141-397X) Avail: ESDU

This Data Item is an addition to the Aerodynamics Subseries. A method is described for estimating the wing planform contribution to the derivatives of yawing moment and sideforce due to roll rate, (N sub p) sub W and (Y sub p) sub w, at subsonic speeds. The method applies to wings without dihedral, camber or twist, in the clean condition, i.e. with any high-lift devices retracted. The method was originally developed for untapered wings but data have been provided to take into account the small effect of wing taper. The method for the sideforce derivative applies only over the range of lift coefficients for which the flow is attached to the wing surface and (Y sub p) sub w varies linearly with lift coefficient. The data cover an aspect ratio range from 2 to 12 and wing sweepback angles up to 60 degrees. The first-order effects of subsonic Mach number are also catered for. ESDU

N83-32757 ESDU International Ltd., London (England).
MEAN FORCES PRESSURES, AND MOMENTS FOR CIRCULAR CYLINDRICAL STRUCTURES, FINITE-LENGTH CYLINDERS IN UNIFORM AND SHEAR FLOW
Jun. 1981 52 p refs Sponsored in part by the Royal Aeronautical Soc. and the Institution of Structural Engineers
(ESDU-81017; ISBN-0-85679-343-4; ISSN-0141-397X; ISSN-0141-1003) Avail: ESDU

This Data Item is an addition to the Aerodynamics Subseries and to the Wind Engineering Subseries. Data for estimating the mean forces, pressures and moments induced by flow around a finite length cylindrical structure of circular section are provided. Data are presented in ESDU 80025 for two dimensional flow conditions when the effects of flow around the free end (or ends) are ignored, as with very long cylinders. The data in ESDU 81017 are in the form of correction factors to the two dimensional values to account for the effect of the free end (or ends) and the effect of shear flow. The main effects of Re, surface roughness and flow turbulence are included through the use of ESDU 80025. Simplified calculation sheets allow the application of the basic data to tapered structures and to structures with step changes in cylinder diameter. A method is also provided to allow the method of estimating the two dimensional pressure distribution and flow field velocities in ESDU 80025 to the extended to finite length cylinders in uniform or shear flow. The principal applications for the data lie in calculating the mean wind loading acting on ground based structures such as stacks, towers, silos, storage tanks and chemical processing equipment. ESDU

N83-32758 ESDU International Ltd., London (England).
METHODS FOR ESTIMATING THE PRESSURE DISTRIBUTION ON A TWO-DIMENSIONAL AEROFOIL IN VISCOUS TRANSONIC FLOW
Mar. 1982 22 p refs Sponsored in part by the Ministry of Defence and the Royal Aeronautical Soc.
(ESDU-81019; ISBN-0-85679-344-2; ISSN-0141-4356) Avail: ESDU

This Data Item is an addition to the Transonic Aerodynamics Subseries. Methods for calculating the pressure distribution on a two dimensional aerofoil in attached viscous transonic flow were developed. Two methods are now established. They are extensions to two inviscid transonic flow methods: that of Garabedian and Korn (G&K) and a solution to the Transonic Small Perturbation (TSP) equation. These extensions take into account the boundary layer and wake. Wind tunnel constraint terms are incorporated into the viscous version of the TSP method and this form is the subject of an extensive evaluation performed by comparison with uncorrected experimental data. The evaluation also includes comparisons between the two methods in free-air conditions. A summary of the inviscid methods is given as well as some brief details of the application of tunnel constraint terms. The methods of allowing for viscous effects are also outlined. Details of the viscous flow computer program (VGK and VISTRAN) are given and a comment is made on the different procedures used to calculate drag coefficient. A summary of the evaluation of the method is presented and a few typical examples are given. Finally, conclusions including recommendations regarding the method to be preferred are provided. ESDU

N83-32759 ESDU International Ltd., London (England).
LIFT AND DRAG OF TWO STAGGERED LIFTING SURFACES AT LOW SPEEDS
Aug. 1981 27 p refs Sponsored by the Royal Aeronautical Society

(ESDU-81023; ISBN-0-85679-355-8; ISSN-0141-397X) Avail: ESDU

This Data Item is an addition to the Aerodynamic Subseries. A means of estimating the effect on lift and drag of the variation in geometry and disposition is described, with respect to each other and to the center of gravity, of a combination of two straight-tapered lifting surfaces trimmed in pitch and having a given margin of static stability. It is a simple, but practical method suitable for application in the early stages of an aircraft design project or for the incorporation into a multivariate analysis program. The method has been programmed in BASIC and a listing is given. Two comprehensive examples illustrating typical uses of the data are also given. ESDU

N83-32760 ESDU International Ltd., London (England).
DRAG OF AXISYMMETRIC COWLS AT ZERO INCIDENCE FOR SUBSONIC MACH NUMBERS
Nov. 1981 39 p refs Sponsored by the Royal Aeronautical Society
(ESDU-81024; ISBN-0-85679-356-6; ISSN-0141-397X) Avail: ESDU

This Data Item is an addition to the Aerodynamic Subseries. A simple method of estimating the drag of axisymmetric cowls at subsonic speeds is presented. The cowl is assumed to consist of a forebody and an afterbody having a sharp trailing-edge, with or without a cylindrical midbody. The forebodies considered are the widely-used NACA 1 - series although consideration is also given to improvements attainable at low speeds by means of an increased leading-edge radius. The cowl drag is assumed to consist of three components. i.e. profile spillage and wave drags. The method used to predict profile drag was derived from correlations of form factors calculated using measured pressure distributions. The methods used to predict the spillage and wave drag components are, however, empirical, being based on correlations of both published and unpublished experimental data. ESDU

N83-32761 ESDU International Ltd., London (England).
LINEARIZED TWO-DIMENSIONAL OSCILLATORY AIRFORCE COEFFICIENTS AND LOAD DISTRIBUTIONS ON THIN AEROFOILS IN SUBSONIC FLOW
Nov. 1981 27 p refs Sponsored by the Royal Aeronautical Society
(ESDU-81034; ISBN-0-85679-367-1; ISSN-0141-397X) Avail: ESDU

This Data Item is an addition to the Aerodynamic Subseries. A method is formulated or evaluating the forces, moments and pressure distributions on a thin airfoil (strictly a flat plate) oscillating in heave and in pitch and with the oscillation of a trailing-edge control, with its hinge line at 0.8 of the airfoil chord, in subsonic flow. The airforce coefficients are tabulated over frequency parameter and Mach number ranges of 0.05 to 2 and 0 to 0.9 respectively. Examples of the chordwise load distribution are presented graphically to show the effect of Mach number and frequency parameter. An Appendix provides a set of conversion equations to obtain flutter derivatives from the airforce coefficients and these have been used to derive tables of flutter derivatives. A second Appendix demonstrates the use of two dimensional strip theory to incorporate flutter derivatives into three dimensional flutter equations. ESDU

N83-32762 ESDU International Ltd., London (England).
LINEARISED TWO-DIMENSIONAL OSCILLATORY AIRFORCE COEFFICIENTS AND LOAD DISTRIBUTIONS ON THIN AEROFOILS IN SUPERSONIC FLOW
Mar. 1982 20 p refs Sponsored by Royal Aeronautical Society
(ESDU-82005; ISBN-0-85679-383-3; ISSN-0141-397X) Avail: ESDU

This Data Item is an addition to the Aerodynamics Subseries. Results are presented for use in flutter calculations, obtained from a recently developed FORTRAN computer program. The program embodies a method for evaluating the forces, moments, and pressure distributions on a thin airfoil oscillating harmonically with small amplitude in supersonic flow. The calculations were made for three modes of oscillation, i.e. airfoil heave and pitch, and motion of a trailing edge control surface with its hinge line at 0.8 of the airfoil chord. The results are presented in the form of tabulated aerodynamic force coefficients over a frequency parameter range from 0 to 2.0 and a Mach number range from 1 02 to 5.0. In addition, illustrative graphs are presented to show the effect of frequency and Mach number on oscillatory load distribution in heave and pitch. ESDU

N83-32763 ESDU International Ltd., London (England).
CONTRIBUTION OF FIN TO SIDEFORCE, YAWING MOMENT AND ROLLING MOMENT DERIVATIVES DUE TO SIDESLIP, (Y SUB V) SUB F, (N SUB V) SUB F, (L SUB V) SUB F, IN THE PRESENCE OF BODY, WING AND TAILPLANE
Apr. 1982 25 p refs
(ESDU-82010; ISBN-0-85679-388-4; ISSN-0141-397X) Avail: ESDU

This Data Item is an addition to the Aerodynamics Subseries. A method for estimating the contribution of a fin to the sideforce, yawing moment and rolling moment derivatives due to sideslip for aircraft at subsonic speeds is provided. The data are applicable where there is a linear variation of lift coefficient with angle of attack and a linear variation of sideforce, yawing moment and rolling moment coefficients with angle of sideslip. ESDU

N83-32764 ESDU International Ltd., London (England).
CONTRIBUTION OF FIN TO SIDEFORCE, YAWING MOMENT AND ROLLING MOMENT DERIVATIVES DUE TO RATE OF YAW, (Y SUB R)SUB F, (N SUB R)SUB F, (L SUB R)SUB F
Jun. 1982 4 p refs Sponsored by the Royal Aeronautical Society
(ESDU-82017; ISBN-0-85679-392-2; ISSN-0141-397X) Avail: ESDU

This Data Item is an addition to the Aerodynamic Subseries. A method is provided for estimating the contribution of a fin to the sideforce, yawing moment, and rolling moment derivatives due to rate of yaw for aircraft at subsonic speeds. The data are applicable where there is a linear variation of lift coefficient with angle of attack and a linear variation of sideforce, yawing moment and rolling moment coefficients with angle of sideslip. ESDU

N83-32765 ESDU International Ltd., London (England).
THE PRESSURE DISTRIBUTION AT ZERO INCIDENCE OVER SELECTED FAMILIES OF BLUNT AXISYMMETRIC FOREBODIES
Jun. 1982 57 p refs
(ESDU-82018; ISBN-0-85679-393-0; ISSN-0141-397X) Avail: ESDU

This Data Item is an addition to the Aerodynamics Subseries. Pressure distribution data for the flow of air over four families of blunt forebodies at zero incidence are provided. The families chosen are ellipsoidal, spherically curved nose with radiused shoulder, spherically blunted cone and spherically blunted tangent ogive. The ranges of geometry and Mach number covered for each family are as wide as possible dependent on the available of data. The pressure distribution data were largely derived either from theoretical methods involving inviscid finite difference techniques or the method of characteristics or from experimental data. The pressure distribution data are used as a means of estimating, for inviscid flow, the surface Mach number distribution and the temperature distribution with no heat transfer. ESDU

N83-32766 ESDU International Ltd., London (England).
INTRODUCTION TO UNSTEADY AERODYNAMICS
Sep. 1982 50 p refs
(ESDU-82020; ISBN-0-85679-399X; ISSN-0141-397-X) Avail: ESDU

This Data Item is an addition to the Aerodynamics Subseries. This introduction to unsteady aerodynamics provides a general background of current linearized theoretical methods. A section is included to remind the reader of the basic principles that underline linearized theory. Various analytical methods applicable to airfoil

sections (two dimensions) and wings (three dimensions) oscillating in simple harmonic motion in both subsonic and supersonic flow are described. The practicalities of semi-empirical methods and the applications of unsteady aerodynamics to flutter, atmospheric disturbances, and active control systems are also discussed. ESDU

N83-32767 ESDU International Ltd., London (England).
PRESSURE DRAG OF SPHERICALLY-BLUNTED CONICAL FORBODIES AT ZERO INCIDENCE FOR MACH NUMBERS OF 3 AND ABOVE
Oct. 1982 14 p refs Supersedes ESDU-68021
(ESDU-82028; ESDU-68021; ISBN-0-84579-409-0; ISSN-0141-397X) Avail: ESDU

This Data Item is an addition to the Aerodynamics Subseries. A simple graphical means is provided for estimating the pressure drag of spherically blunted conical forebodies at zero incidence for any flight Mach number > or = 3. The data are presented for two ranges of cone semi-apex angle delta. For 0 deg < or = delta < or = 90 deg. For 0 deg < or = delta < or = 40 deg the charts cover a wide range of blunting, varying from a sharp cone at one extreme to a spherically-curved face at the other. For 40 deg < or = delta < or = 90 deg the single chart applies to sharp or moderately-blunted (nose radius/base radius < or = 0.5) cones. The charts were derived largely from potential flow calculations. However, for a considerable range of flow conditions boundary layer effects were found to be small and the data represent a good approximation to the total forebody drag in such conditions. ESDU

N83-32768 ESDU International Ltd., London (England).
AIRCRAFT FORCES DUE TO INTERFERENCE BETWEEN A JET EFFLUX AND A SLOTTED FLAP
Nov. 1982 31 p refs
(ESDU-82034; ISBN-0-85679-415-5; ISSN-0141-397X) Avail: ESDU

This Data Item is an addition to the Aerodynamics Subseries. A simple method of predicting, at the project stage of the design of an aircraft, the lift, drag and pitching moment increments arising from a lift augmentation system in which the jet efflux of an underwing-mounted engine impinges on the wing and trailing-edge flaps is provided. The method is applicable to turbojet or turbofan powered aircraft with underwing nacelles and is also applicable to all trailing-edge slotted-flap systems, whether single or multi-element. The experimental data used in developing the method relate largely to transport aircraft with aspect ratios varying from about 5 to 8 and quarter-chord sweeps varying from 0 to 28 degrees. Two comprehensive worked examples are included, dealing with typical twin-engine and four-engine transports. ESDU

N83-32769 ESDU International Ltd., London (England).
APPROXIMATE PARAMETRIC METHOD FOR PROPELLER THRUST ESTIMATION
Apr. 1983 17 p
(ESDU-83001; ISBN-0-85679-429-5; ISSN-0141-4054) Avail: ESDU

This data item is an addition to the performance Subseries. An approximate method of determining the uninstalled static thrust and the thrust lapse characteristics for a wide variety of constant-speed propellers is provided. The method provides estimates of thrust for propellers operating at airspeeds up to 300 kn, and for which 2 < or = power/sq (diameter) < or = 16 hp/sq ft (16 < or = power/sq (diameter) < or = 128 kW/sq m and 6700 < or = tipspeed < or = 1000 ft/s (200 < or = tipspeed < or = 300 m/s). The data are intended for use in project estimations and are particularly suited to aeroplanes in the light and general aviation categories. ESDU

N83-32770 ESDU International Ltd., London (England).
CONTRIBUTION OF FIN TO SIDEFORCE, YAWING MOMENT AND ROLLING MOMENT DERIVATIVES DUE TO RATE OF ROLL, (Y SUB P) SUB F, (N SUB P) SUB F, (L SUB P) SUB F, IN THE PRESENCE OF BODY, WING AND TAILPLATE
Apr. 1983 20 p refs
(ESDU-83006; ISBN-0-85679-426-0; ISSN-0141-397X) Avail: ESDU

This Data Item is an addition to the Aerodynamics Subseries. A method is provided for calculating the contributions of the vertical stabilizing fin of an aircraft to the sideforce, yawing moment, and rolling moment derivatives due to rate of roll. The method is applicable for subsonic flight speeds when the flow over the aircraft is wholly subsonic and fully attached. The tail assemblies covered are those where a single fin is located on top of the aircraft rear body and in the plane of symmetry, with a tailplane, if present, mounted either on the fin itself or on the rear body. The aircraft is assumed to be in the 'clean' configuration with no flaps or slats deployed. The method is semi-empirical. It uses theoretical calculations of the spanwise loadings arising on isolated fin - tailplane arrangements rolling at zero angle of attack to estimate the magnitude and center of pressure position of the damping force on the fin. Corrections in terms of the mean sidewash occurring at the fin are made to allow for the presence of the wing and body and for angle of attack variations. The magnitudes of the corrections are deduced from comparisons with a large number of wind tunnel test results. ESDU

N83-32771 Royal Aircraft Establishment, Farnborough (England).
NUMERICAL AERODYNAMIC STUDIES OF ASYMMETRIC GUST ENTRY
H. C. Garner 5 Jan. 1982 54 p refs
(RAE-TR-81157; RAE-Struct-BF/B/920; BR83222) Copyright. Avail: Issuing Activity

Lifting surface calculations for a wing at Mach number 0.8 are used to examine the aerodynamic consequences when one side of an aircraft enters a vertical gust before the other. The growth of lift, pitching moment, aileron hinge moment and the behavior of the transient rolling moment are analyzed. Their dependence on the inclination of the gust front and the length of a (1-cosine) gust is discussed. Idealized calculations of control-surface motion to suppress the wing root bending moment or to achieve undisturbed flight show only minor effects of gust inclination on control demand. But the transient rolling moment from asymmetric entry into a (1-cosine) gust within the spectrum of current airworthiness requirements is large enough to constitute a considerable handling problem. Ride control studies to eliminate heave, pitch and roll by two ailerons and an auxiliary tailplane or canard reveal distinct advantages of the canard as an active control. Author (ESA)

N83-32772# Texas A&M Univ., College Station. Dept. of Aerospace Engineering.
A CATALOG OF LOW REYNOLDS NUMBER AIRFOIL DATA FOR WIND TURBINE APPLICATIONS
S. J. Miley Feb. 1982 622 p refs
(Contract DE-AC04-76DP-35333)
(RFP-3387) Avail: NTIS HC A99/MF A01

Data on airfoils at low Reynolds numbers, which would be applicable to small wind energy conversion systems, were surveyed, screened, and compiled. Coordinates, lift, drag, and pitching moment characteristics in both tabular and graphical form are given for each airfoil discussed. Airfoil behavior and the effects of Reynolds number, surface roughness, and turbulence are also shown. Problems associated with presenting airfoil data at large angles of attack are considered as well as Airfoil characteristics and aerodynamics and the interpretation and utilization of airfoil data. A.R.H.

N83-32773# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Aerospace and Ocean Engineering.
EFFECTS OF VISCOSITY AND SURFACE TENSION ON A JET PLUME IN SUPERSONIC CROSSFLOW
A. S. Nejad and J. A. Schetz Sep. 1982 35 p refs Sponsored by AFOSR Backup document for AIAA Synoptic scheduled for publication in AIAA Journal in Feb. 1984
Avail: NTIS HC A03/MF A01

The effects of injectant viscosity and surface tension, injector diameter, and the ratio of jet to freestream dynamic pressure on

the break-up and atomization of a transverse liquid jet in a supersonic airstream was conducted. The tests were run at Mach 3.0 with ambient stagnation temperature and a stagnation pressure of 4.2 atm. Short exposure photographs were used to establish the instantaneous structure of the jet. Longer exposure photographs were taken for jet penetration measurements. A multiexposure technique was used to study the velocities of the surface waves along the windward edge of the jet. The important results are: (1) for low viscosity and low surface tension, wave growth and cross fracture of the jet is the main mechanism of atomization; (2) for high viscosity, ligament formation is the principle mechanisms for atomization; (3) penetration first increases with increasing viscosity and then decreases; (4) penetration is independent of surface tension; (5) surface tension has little effect on wave propagation speed; (6) increasing viscosity decreases the wave propagation speed; and (7) increasing viscosity reduces wave growth on the jet surface. Author

N83-32774*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

COMPARISON OF TWO- AND THREE-DIMENSIONAL FLOW COMPUTATIONS WITH LASER ANEMOMETER MEASUREMENTS IN A TRANSONIC COMPRESSOR ROTOR

Rodrick V. Chima and Anthony J. Strazisar Sep. 1982 21 p refs Presented at ASME 27th Intern. Gas Turbine Conf., London, 18-22 Apr. 1982 Film supplement C-299 available

(NASA-TP-1931; E-1007; NAS 1.60:1931) Avail: NTIS HC A02/MF A01 CSCL 01A

Two and three dimensional inviscid solutions for the flow in a transonic axial compressor rotor at design speed are compared with probe and laser anemometers measurements at near-stall and maximum-flow operating points. Experimental details of the laser anemometer system and computational details of the two dimensional axisymmetric code and three dimensional Euler code are described. Comparisons are made between relative Mach number and flow angle contours, shock location, and shock strength. A procedure for using an efficient axisymmetric code to generate downstream pressure input for computationally expensive Euler codes is discussed. A film supplement shows the calculations of the two operating points with the time-marching Euler code. Author

N83-32775*# Grumman Aerospace Corp., Bethpage, N.Y.

THE NCOREL COMPUTER PROGRAM FOR 3D NONLINEAR SUPERSONIC POTENTIAL FLOW COMPUTATIONS Final Report

Michael J. Siclari Washington NASA Aug. 1983 164 p refs

(Contract NAS1-16758)

(NASA-CR-3694; NAS 1.26:3694) Avail: NTIS HC A08/MF A01 CSCL 01A

An innovative computational technique (NCOREL) was established for the treatment of three dimensional supersonic flows. The method is nonlinear in that it solves the nonconservative finite difference analog of the full potential equation and can predict the formation of supercritical cross flow regions, embedded and bow shocks. The method implicitly computes a conical flow at the apex (R = 0) of a spherical coordinate system and uses a fully implicit marching technique to obtain three dimensional cross flow solutions. This implies that the radial Mach number must remain supersonic. The cross flow solutions are obtained by using type dependent transonic relaxation techniques with the type dependency linked to the character of the cross flow velocity (i.e., subsonic/supersonic). The spherical coordinate system and marching on spherical surfaces is ideally suited to the computation of wing flows at low supersonic Mach numbers due to the elimination of the subsonic axial Mach number problems that exist in other marching codes that utilize Cartesian transverse marching planes. S.L.

N83-32776*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

THEORETICAL AND EXPERIMENTAL INVESTIGATION OF SUPERSONIC AERODYNAMIC CHARACTERISTICS OF A TWIN-FUSELAGE CONCEPT

Richard M. Wood, David S. Miller, and Kenneth S. Brentner Aug. 1983 39 p refs

(NASA-TP-2184; L-15607; NAS 1.61:2184) Avail: NTIS HC A03/MF A01 CSCL 01A

A theoretical and experimental investigation has been conducted to evaluate the fundamental supersonic aerodynamic characteristics of a generic twin-body model at a Mach number of 2.70. Results show that existing aerodynamic prediction methods are adequate for making preliminary aerodynamic estimates. Author

N83-32777*# Sikorsky Aircraft, Stratford, Conn.

ANALYSIS AND CORRELATION OF THE TEST DATA FROM AN ADVANCED TECHNOLOGY ROTOR SYSTEM

D. Jepson, R. Moffitt, K. Hilzinger, and J. Bissell Washington NASA Aug. 1983 169 p refs

(Contract NAS2-10211)

(NASA-CR-3714; NAS 1.26:3714; SER-510034) Avail: NTIS HC A08/MF A01 CSCL 01A

Comparisons were made of the performance and blade vibratory loads characteristics for an advanced rotor system as predicted by analysis and as measured in a 1/5 scale model wind tunnel test, a full scale model wind tunnel test and flight test. The accuracy with which the various tools available at the various stages in the design/development process (analysis, model test etc.) could predict final characteristics as measured on the aircraft was determined. The accuracy of the analyses in predicting the effects of systematic tip planform variations investigated in the full scale wind tunnel test was evaluated. S.L.

N83-32778# Physics Lab. RVO-TNO, The Hague (Netherlands). Researchgroep 9: Operationele Research.

MAGNUS CHARACTERISTICS OF A ROTATING BODY IN AN AIR FLOW

A. Wijbenga Jul. 1982 31 p refs In DUTCH; ENGLISH summary

(Contract A76/KM/029)

(PhL-1982-37; TDCK-76817) Avail: NTIS HC A03/MF A01

Five theoretical approaches were applied to the calculation of the magnus force, acting on a body of revolution. Based on a comparison of the calculation results and the available measurements, the most reliable method is chosen to be applied in a computer simulation of a rolling airframe missile. Author (ESA)

N83-32779# National Aerospace Lab., Amsterdam (Netherlands). Fluid Dynamics Div.

A PANEL METHOD FOR THE PREDICTION OF AERODYNAMIC CHARACTERISTICS OF COMPLEX CONFIGURATIONS IN LINEARIZED SUBSONIC OR SUPERSONIC FLOW

H. W. M. Hoeijmakers 13 Aug. 1982 13 p refs Presented at AGARD Fluid Dyn. Panel Symp. on Missile Aerodyn., Trondheim, Norway, 20-22 Sep. 1982 Sponsored by Directorate of Material of the Royal Netherlands Air Force

(NLR-MP-82040-U) Avail: NTIS HC A02/MF A01

A linear panel method was developed for the computation of the velocity and pressure distribution and the aerodynamic forces on complex configurations in linearized sub or supersonic flow. The method is based on the same principles as USSAERO but computing time is reduced by a factor of two to three by a more efficient computation of the aerodynamic influence coefficient. By using dynamic array dimensioning, together with segmented loading, an optimal usage of central memory and mass storage devices is achieved. Compared to USSAERO the geometric capability of the method is enlarged considerably. It can handle configurations with any number of body-like components and lifting surfaces, both at incidence and at side slip. The method was applied to a number of test cases, including missile type configurations. Within the range of applicability of linearized subsonic and supersonic flow theory the numerical results agree reasonably with experimental data. Author (ESA)

N83-32780# Aeronautical Research Inst. of Sweden, Stockholm. Aerodynamics Dept.
THE FFA WING BODY 83 COMPUTER PROGRAM. A PANEL METHOD FOR DETERMINATION OF AEROELASTIC CHARACTERISTICS AT SUBSONIC AND SUPERSONIC SPEEDS
Sven G. Hedman and Lars G. Tysell Feb. 1983 12 p ref
(Contract F-INK-82223-78-003-24-001)
(FFA-TN-1983-3) Avail: NTIS HC A02/MF A01

A panel program for rigid airplanes was extended for the calculation of aerodynamic characteristics of configurations with elastic wings. The equations for a direct solution of the deformed shape and its loading are outlined. Input modifications are described. The program was used with an iterative or a direct solution, for calculations of the aeroelastic characteristics of both low and high aspect ratio body wing configurations. Good agreement with data from tests or alternate estimates is reached. The direct solution method is considerably faster than the iterative. Author (ESA)

N83-32781# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
WIND TUNNEL TESTING OF THREE-DIMENSIONAL MODELS IN WIND TUNNELS WITH TWO ADAPTIVE WALLS
E. Wedemeyer Oct. 1982 30 p refs
(VKI-TN-147) Avail: NTIS HC A03/MF A01

It is shown that wind tunnel walls can be adapted in such a way that wall interference becomes extremely small. A computational method which determines the required wall deflection from pressure measurements at the walls is described. It is based on the linearized perturbation potential for the disturbance flow. For a three dimensional wind tunnel model with 4.4 % blockage ratio, residual interferences are computed, and wind tunnel measurements which verify the predicted reduction of wall interferences by dimensional wall adaptation are performed. Author (ESA)

N83-32718# Air Force Systems Command, Wright-Patterson AFB, Ohio.
RELAXATION COMPUTATION OF TRANSONIC FLOWS AROUND WINGS WITH BLUNT LEADING-EDGE AND DISCUSSION ON ITS STABILITY AND CONVERGENCE
Zheng Yuwen and Luo Shijun *In its* Acta Aeron. et Astronautica Sinica (FTD-ID(RS)T-1605-82) 4 Mar. 1983 p 1-21 refs Transl. into ENGLISH from Hang Kong Xuebao (China), v. 3, no. 3, Sep. 1982 p 1-12 (For primary document see N83-32717 21-01)
Avail: NTIS HC A08/MF A01 CSCL 01/1

N83-32719# Air Force Systems Command, Wright-Patterson AFB, Ohio.
DETERMINATION OF AERODYNAMIC COEFFICIENTS FOR A RE-ENTRY BODY BY MEANS OF AN EXTENDED KALMAN FILTER
Jiang Quanwei, Xu Jinzhi, and Zhou Shuying *In its* Acta Aeron. et Astronautica Sinica (FTD-ID(RS)T-1605-82 4 Mar. 1983 p 22-39 refs Transl. into ENGLISH from Hang Kong Xuebao (China), v. 3, no. 3, Sep. 1982 p 15-22 (For primary document see N83-32717 21-01)
Avail: NTIS HC A08/MF A01 CSCL 01/1

N83-32728# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ACCURACY AND APPLICATION OF A SECOND-ORDER THEORY FOR THREE-DIMENSIONAL SUPERSONIC AND LOW HYPERSONIC UNSTEADY FLOWS AROUND A THIN WING
Qian Fuxing (Academia Sinica), Gu Weikai (Academia Sinica), and He Longde (Academia Sinica) *In its* Acta Aeron. et Astronautica Sinica (FTD-ID(RS)T-0664-82) 4 Mar. 1983 p 1-16 refs Transl. into ENGLISH from Hang Kong Xuebao (China), v. 2, no. 1, 1981 16 p (For primary document see N83-32727 21-01)
Avail: NTIS HC A10/MF A01 CSCL 01/1

N83-32732# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
A UNIVERSAL METHOD FOR SOLVING THE TWO-DIMENSIONAL CASCADE WITH FREE STREAMLINE BOUNDARIES
Chen Jingyi (Academia Sinica) *In its* Acta Aeron. et Astronautica Sinica (FTD-ID(RS)T-0664-82) 4 Mar. 1983 p 94-112 refs Transl. into ENGLISH from Hang Kong Xuebao (China), v. 2, no. 1, 1981 29 p (For primary document see N83-32727 21-01)
Avail: NTIS HC A10/MF A01 CSCL 01/1

N83-32740# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
AERODYNAMIC COMPUTATION OF THE WING-BODY-SHORT CABIN COMPOSITE
Chen Yao Song *In its* Mech. and Practice (Selected Articles) 28 Mar. 1983 p 15-25 refs Transl. into ENGLISH from Lixue yu Shijian (China), v. 4, no. 3, 1982 p 39-43 (For primary document see N83-32738 21-01)
Avail: NTIS HC A03/MF A01 CSCL 01/1

N83-33428# Centre National d'Etudes Spatiales, Toulouse (France).
STATOSPHERIC BALLOON LAUNCH CENTERS [LES CENTRES DE LANCEMENTS DE BALLONS STRATOSPHERIQUES]
Pierre Vincent *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 191-194 refs In FRENCH (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

N83-33455# Centre National d'Etudes Spatiales, Toulouse (France).
RESULTS OF LONG DURATION BALLOON FLIGHTS
Pierre Malaterre *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 359-362 (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

N83-33456# Centre National d'Etudes Spatiales, Toulouse (France).
LONG DURATION FLIGHTS IN EUROPE
Armand Soubrier *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 363-364 (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N83-32782*# Kansas Univ. Center for Research, Inc., Lawrence. Flight Research Lab.
A METHOD OF PREDICTING FLOW RATES REQUIRED TO ACHIEVE ANTI-ICING PERFORMANCE WITH A POROUS LEADING EDGE ICE PROTECTION SYSTEM Final Report
David L. Kohlman and Alan E. Albright Aug. 1983 25 p refs Revised
(Grant NAG3-71)
(NASA-CR-168213; NAS 1.26:168213; KU-FRL-464-5-Rev-A)
Avail: NTIS HC A02/MF A01 CSCL 01C

An analytical method was developed for predicting minimum flow rates required to provide anti-ice protection with a porous leading edge fluid ice protection system. The predicted flow rates compare with an average error of less than 10 percent to six experimentally determined flow rates from tests in the NASA Icing Research Tunnel on a general aviation wing section. Author

N83-32783*# Ohio State Univ., Columbus. Dept. of Aviation.
A SUMMARY AND INTEGRATION OF RESEARCH CONCERNING SINGLE PILOT IFR OPERATIONAL PROBLEMS Final Report
G. Courtney Chapman Washington NASA Aug. 1983 73 p refs

(Grant NAG1-238)
(NASA-CR-3716; NAS 1.26:3716) Avail: NTIS HC A04/MF A01 CSCL 01C

A review of seven research studies pertaining to Single Pilot IFR (SPIFR) operations was performed. Two studies were based on questionnaire surveys; two based on National Transportation Safety Board (NTSB) reports; two were based on Aviation Safety Reporting System (ASRS) incident reports, and one report used event analysis and statistics to forecast problems. The results obtained in each study were extracted and integrated. Results were synthesized and key issues pertaining to SPIFR operations problems were identified. The research that was recommended by the studies and that addressed the key issues is catalogued for each key issue. Author

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications.*

N83-32784# Lincoln Lab., Mass. Inst. of Tech., Lexington.
TRAFFIC ALERT AND COLLISION AVOIDANCE SYSTEM (TCAS): A FUNCTIONAL OVERVIEW OF MINIMUM TCAS 2
J. D. Welch and V. A. Orlando 8 Apr. 1983 77 p refs
(Contracts F19628-80-C-0002; DOT-FA72-WAI-817; FAA Proj. 054-241-04)
(ATC-119; FAA-PM-83-10) Avail: NTIS HC A05/MF A01

The Traffic Alert and Collision Avoidance System (TCAS) is a beacon-based airborne collision avoidance system that is able to operate in all airspace without reliance on ground equipment. The TCAS concept encompasses a range of capabilities that include TCAS 1, a low-cost, limited-performance version, and TCAS 2, which is intended to provide a comprehensive level of separation assurance in all current and predicted airspace environments through the end of this century. A functional overview of the TCAS 2 including operating features, a description of the avionics package, and examples of surveillance data obtained with experimental TCAS equipment are provided. Author

N83-32785# Bundesanstalt fuer Flugsicherung, Frankfurt am Main (West Germany).
[ACTIVITIES OF THE FEDERAL ADMINISTRATION OF AIR NAVIGATION SERVICES (BFS)] Annual Report, 1982
1982 25 p In ENGLISH and GERMAN Original contains color illustrations
Avail: NTIS HC A02/MF A01

The West German air traffic control service is presented. Airspace structure; multiple radar coverage; and air traffic display by radar are described. The aeronautical information service and aeronautical telecommunication service are introduced. The air navigation engineering service; joint flight inspection unit; and electronic data processing facilities are reviewed. Author (ESA)

N83-32786# National Aerospace Lab., Amsterdam (Netherlands). Information Div.
INTERFACING THE ROLM 1602B FOR THE METRO NAVIGATION SYSTEM
J. M. P. C. M. Visser 26 Jan. 1983 15 p refs Presented at 1st European ROLM Users Group Conf., 5-7 Oct. 1981, Offenbach, West Germany
(NLR-MP-81062-U) Avail: NTIS HC A02/MF A01

An airborne computer configuration, based on a ROLM 1202B computer, was developed for acquisition of position data and for the development of real time position algorithms. Several ROLM interfaces were developed for input and output of data in ARINC and IRIG-B format. By housing the interfaces in the ROLM 1602B itself, minimal additional volume was required. Advantages of a microprocessor based interface include adaptability for various kinds of data-inputs; a minimum number of different interfaces to be developed; and validation and preselection of the data, thereby minimizing the overhead in data acquisition. Author (ESA)

N83-32735# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
DEVELOPMENT OF AN ASTRO-INERTIAL HYBRID NAVIGATION SYSTEM AND A STAR TRACKER
Shen Gongxun, Qin Shiguang, Chang Qingzhi, and Zhou Danian *In its* Acta Aeron. et Astronautica Sinica (FTD-ID(RS)T-0664-82) 4 Mar. 1983 p 149-174 refs Transl. into ENGLISH from Hang Kong Xuebao (China), v. 2, no. 1, 1981 26 p (For primary document see N83-32727 21-01)
Avail: NTIS HC A10/MF A01 CSCL 17/7

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N83-32787 ESDU International Ltd., London (England).
THE USE OF DATA ITEMS ON AIRCRAFT PERFORMANCE ESTIMATION
Oct. 1980 15 p refs Sponsored by the Royal Aeronautical Society
(ESDU-80026; ISBN-0-85679-309-4; ISSN-0141-4054) Avail: ESDU

This Data Item is an addition to the Aircraft Performance Subseries. The reasons for estimating aircraft performance are described. The methods and data available in the ESDU Aircraft Performance Subseries are reviewed and a summary of the data dealing with particular topics are presented in block diagram form. Although individual parts of the Subseries are necessarily directed to particularly topics, many contain information of wider applicability than is suggested by their titles and the more substantial of such cases are noted. ESDU

N83-32788 ESDU International Ltd., London (England).
SIMPLIFIED FORMS OF PERFORMANCE EQUATIONS
Nov. 1980 9 p refs Sponsored by the Royal Aeronautical Society
(ESDU-80032; EG-0/0; ISBN-0-85679-315-9; ISSN-0141-4054) Avail: ESDU

This Data Item is an addition to the Aircraft Performance Subseries. Simplified forms of airplane performance equations and the numerical constants associated with different sets of commonly used units are presented. These equations complement the more fundamental and detailed treatments given in other parts of the Aircraft Performance Subseries and are intended for use in project design work with jet or propeller driven aircraft, although, in the case of some low speed airplanes, they are adequate for most other purposes. The along flight path performance equation incorporating a simple parabolic drag law is presented in alternative forms depending on whether speed is expressed in terms of equivalent airspeed or Mach number. Further versions present the variables in the form of non dimensional groups which are, themselves, of importance in the presentation of measured performance data. ESDU

N83-32789 ESDU International Ltd., London (England).
ESTIMATION OF WINDMILLING DRAG AND AIRFLOW OF TURBO-JET AND TURBO-FAN ENGINES
Jul. 1981 17 p refs Sponsored by the Royal Aeronautical Society
(ESDU-81009; ISBN-0-85679-334-5; ISSN-0141-4054) Avail: ESDU

This Data Item is an addition to the Aircraft Performance Subseries. A method for estimating the internal drag airflow of turbojet and turbofan engines in windmilling and, to a lesser extent, locked-rotor conditions for use in the assessment of aircraft performance with one or more engines inoperative are presented. The data can be used for any flight conditions although those of greatest interest are likely to be during takeoff, climb, and landing. They can, of course, also be used for cruise conditions, for example, ferry flights or drift-down with one or more engines inoperative. Other installation effects are considered. The data presented may be combined with intake spillage drag data to give an estimate of the total drag increment arising from an inoperative engine. Information relating to the empirical development of the methods using a one dimensional flow theory as a basis is given. ESDU

N83-32790 ESDU International Ltd., London (England).
REPRESENTATION OF DRAG IN AIRCRAFT PERFORMANCE CALCULATIONS
Sep. 1981 26 p refs Supersedes EG-1/1
(ESDU-81026; EG-1/1; ISBN-0-85679-356-6; ISSN-0141-4054) Avail: ESDU

This Data Item is an addition to the Aircraft Performance Subseries. Methods used to represent airframe drag for performance calculations for all flight conditions in terms of the general functional relationships between the variables are described. Several analytical variants of the familiar parabolic relationship between lift and drag are introduced, their limitations pointed out and some useful derived expressions presented and plotted. The airplane and component drag data available elsewhere in the ESDU Aerodynamics, Performance, and Transonic Aerodynamics Subseries are summarized. Examples of the drag characteristics of particular airplanes are also given in the Addenda to ESDU 81026 to illustrate the methods of representation discussed. Each addenum gives the relationship between lift and drag coefficients for a particular airplane and in most cases curves are included to show the variation of drag with speed or Mach number at a typical weight and altitude. The airplane, particular features of the data and/or additional notation are described. ESDU

N83-32791 ESDU International Ltd., London (England).
ESTIMATION OF ROLLING MOMENT DERIVATIVE DUE TO SIDESLIP FOR COMPLETE AIRCRAFT AT SUBSONIC SPEEDS
Oct. 1981 19 p refs Sponsored in part by the Royal Aeronautical Society
(ESDU-81032-AMEND-A; ISBN-0-85679-364-7; ISSN-0141-397X) Avail: ESDU

This Data Item is an addition to the Aerodynamics Subseries. The estimation of the rolling moment derivative due to sideslip for complete aircraft at subsonic speeds is illustrated. This report shows how to combine the ESDU methods for prediction the contributions of the separate parts of the aircraft. Cruise, landing and take-off configurations are covered. These prediction methods are applicable where there is a linear variation of lift coefficient with angle of attack and of rolling moment coefficient with angle of sideslip. B.W.

N83-32792 ESDU International Ltd., London (England).
ACCELERATION FACTORS FOR CLIMB AND DESCENT RATES AT CONSTANT EAS, CAS, M
Nov. 1981 12 p ref Supersedes ESDU-70023
(ESDU-81046; ESDU-70023; ISBN-0-85679-379-5; ISSN-0141-4054) Avail: ESDU

This Data Item is an addition to the Aircraft Performance Subseries. Algebraic, numerical and graphical forms of acceleration factors are given which provide a simple, direct method of taking into account the acceleration of an aircraft along the flight path in the calculation of instantaneous (or point) rates of climb and descent. The particular cases considered are climb or descent at constant equivalent airspeed (EAS) constant calibrated airspeed (CAS) and constant Mach number. The general relationships for these acceleration factors are given while separate tables give the numerical forms of the equations appropriate to the International Standard Atmosphere and associated off standard atmospheres. ESDU

N83-32793 ESDU International Ltd., London (England).
FIRST APPROXIMATION TO TAKE-OFF DISTANCE TO 50 ft (15.2m) FOR LIGHT AND GENERAL AVIATION AIRPLANES
Nov. 1982 12 p refs
(ESDU-82033; ISBN-0-85679-413-9; ISSN-0141-4054) Avail: ESDU

This Data Item is an addition to the Aircraft Performance Subseries. The take off distance to 50 ft (15.2 m) of light and general aviation airplanes from hard, level, dry runways in still air was estimated. Two methods are given: a rapid method which uses engine power to give estimates of the takeoff distance for a restricted range of propeller-driven airplanes only. The other, more general, method requires the use of powerplant thrust in place of engine power and so embraces a greater variety of airplanes, including those powered by turbojet and turbofan engines. For each method recommended, lines are given for different classes of aircraft together with an indication of the spread of the data used. Approximately 60 to 65 percent of the data used (56 airplanes) lie with + or - 10 percent of the recommended lines. ESDU

N83-32794# Aeronautical Research Labs., Melbourne (Australia).
PRELIMINARY KINEMATIC CONSISTENCY CHECKING OF HELICOPTER FLIGHT DATA
N. E. Gilbert and M. J. Williams Jan. 1983 31 p refs
(ARL-AERO-Note-414; AR-002-935) Avail: NTIS HC A03/MF A01

A simplified approach to kinematic consistency checking applied to Sea King helicopter flight trials data is given. Prompt implementation of the method was possible, pending longer term development of systems identification technique suitable for application in a general way to helicoper data. This has allowed the formation of a trials data bank with reasonable confidence in the kinematic quantities so that validation of the Sea King mathematical model can continue. In the process adopted, measurements are first digitally filtered to remove noise. Alternative values of kinematic quantities are then derived from the smoothed measurements, using numerical differentiation or integration. For quantities obtained by integration, two separate iteration cycles are used, thus enabling kinematic equations to be integrated independently by 'separation of variables' using the trapezoidal formula. S.L.

N83-32795*# Dynamics Research Corp., Wilmington, Mass.
APPLICATION OF THE HARDMAN METHODOLOGY TO THE ARMY REMOTELY PILOTED VEHICLE (RPV) Final Report
8 Apr. 1983 215 p refs
(Contract JPL-956320)
(NASA-CR-172966; NAS 1.26:172966; R-408U) Avail: NTIS HC A10/MF A01 CSCL 01C

The application of the HARDMAN Methodology to the Remotely Piloted Vehicle (RPV) is described. The methodology was used to analyze the manpower, personnel, and training (MPT) requirements of the proposed RPV system design for a number of operating scenarios. The RPV system is defined as consisting of the equipment, personnel, and operational procedures needed to perform five basic artillery missions: reconnaissance, target acquisition, artillery adjustment, target designation and damage assessment. The RPV design evaluated includes an air vehicle (AV), a modular integrated communications and navigation system (MICNS), a ground control station (GCS), a launch subsystem (LS), a recovery subsystem (RS), and a number of ground support requirements. The HARDMAN Methodology is an integrated set of data base management techniques and analytic tools, designed to provide timely and fully documented assessments of the human resource requirements associated with an emerging system's design. S.L.

N83-32796*# Virginia Polytechnic Inst. and State Univ., Blacksburg.

DEVELOPMENT OF A MULTILEVEL OPTIMIZATION APPROACH TO THE DESIGN OF MODERN ENGINEERING SYSTEMS Ph.D. Thesis
Jean-Francois Marie Barthelemy Hampton, Va. NASA. Langley Research Center Aug. 1983 238 p refs
(Grant NAG1-145)
(NASA-CR-172184; NAS 1.26:172184) Avail: NTIS HC A11/MF A01 CSCL 01C

A general algorithm is proposed which carries out the design process iteratively, starting at the top of the hierarchy and proceeding downward. Each subproblem is optimized separately for fixed controls from higher level subproblems. An optimum sensitivity analysis is then performed which determines the sensitivity of the subproblem design to changes in higher level subproblem controls. The resulting sensitivity derivatives are used to construct constraints which force the controlling subproblems into chosing their own designs so as to improve the lower levels subproblem designs while satisfying their own constraints. The applicability of the proposed algorithm is demonstrated by devising a four-level hierarchy to perform the simultaneous aerodynamic and structural design of a high-performance sailplane wing for maximum cross-country speed. Finally, the concepts discussed are applied to the two-level minimum weight structural design of the sailplane wing. The numerical experiments show that discontinuities in the sensitivity derivatives may delay convergence, but that the algorithm is robust enough to overcome these discontinuities and produce low-weight feasible designs, regardless of whether the optimization is started from the feasible space or the infeasible one. Author

N83-32797# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
AEROELASTIC STABILITY OF A FORWARD SWEPT WING WITH WING TIP STORES M.S. Thesis - Purdue Univ.
William Gene Steele Dec. 1982 72 p refs
(AD-A125457; AFIT-CI-NR-82-69T) Avail: NTIS HC A04/MF A01 CSCL 20/4

When studying stability of an aircraft, a quasi-steady aerodynamic model is often used. In this study, the results of a stability analysis of an unrestrained flexible forward swept wing aircraft using an unsteady aerodynamic formulation are compared to results obtained with a similar, but quasi-steady, aerodynamic formulation. In addition, the potential effects of wing tip stores on forward swept wing aircraft stability are explored. Author (GRA)

N83-32798# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Abt. Mathematische Verfahren und Datentechnik.
RESULTS OF BEAVER AIRCRAFT PARAMETER IDENTIFICATION
Ermin Plaetschke (Technische Hogeschool, Delft), Jan Albert Mulder, and Jan Hendrik Breeman (NLR, Amsterdam) Feb. 1983 46 p refs
(DFVLR-FB-83-10) Avail: NTIS HC A03/MF A01; DFVLR, Cologne DM 15,50

Different design methods led to five test signals which were implemented via an electrohydraulic control system in a flight test program with a De Havilland DHC-2 aircraft. Aircraft parameters were calculated using the maximum likelihood method, and flight path reconstruction followed by linear regression analysis. Each test signal was repeated 10 times, allowing an evaluation based on sample statistics. Input signal type has a considerable effect on parameter estimation accuracy. High frequency signals compare favorably to lower frequency signals for this aircraft. The structure of the mathematical model used does affect the parameter estimation results in terms of sample mean and variance. High accuracy instrumentation techniques reduce the effect of the data analysis procedure on parameter estimation results. Author (ESA)

N83-32799# National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
THE ANALYSIS OF LOAD-TIME HISTORIES BY MEANS OF COUNTING METHODS
J. B. deJonge 13 Aug. 1982 19 p refs Submitted for publication
(NLR-MP-82039-U) Avail: NTIS HC A02/MF A01

The range pair-range (rainflow) counting method for helicopter fatigue analysis is described. The method splits up a load-time history into separate load cycles, having a specific amplitude or range and a specific mean. The counting result can be directly applied in cumulative fatigue damage calculations according to Miner's rule and in simple crack growth calculations. Methods exist to generate load sequences to be applied in fatigue tests or for application in more complex crack growth calculation methods from the matrix. The counting method is insensitive to the size of range filter applied to the signal. The method is the most appropriate one to define the fatigue content of a loading sequence. Author (ESA)

N83-32800# Societe Nationale Industrielle Aerospatiale, Suresnes (France). Lab. Central.
DAMAGE TOLERANCE [LA TOLERANCE AUX DOMMAGES]
J. Hilaire and J. Odorico 31 May 1983 30 p In FRENCH Presented at Journees Aciers Speciaux, Bourget, France, 1983
(SNIAS-831-551-103; DCQ/LC.45449/83) Avail: NTIS HC A03/MF A01

The evolution of the safe life, fail-safe, and damage tolerance design criteria for civil and military airplanes and helicopters is traced. Crack propagation, fracture toughness, and fatigue threshold are defined. Nondestructive testing during production and maintenance are summarized. Author (ESA)

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

N83-32801# Vereinigung Cockpit e.V., Frankfurt am Main (West Germany).
PHANTOMS IN COMPLEX AIRBORNE SYSTEMS [PHANTOMERSCHEINUNGEN BEI KOMPLEXEN BORDSYSTEME]
1982 30 p Partly in ENGLISH and GERMAN
Avail: NTIS HC A03/MF A01

Phantom phenomena - unexplainable nonreproducible malfunctions in electronic airborne equipment - were statistically investigated. These phenomena were observed in Boeings, DC 10, and A-300 aircraft, and are due to the more and more frequent use of electronics in cockpits. The number of reported phantoms is listed for each type of aircraft. A clear increase is observed in aircraft of recent (advanced technology) generations. The number of phantoms per Aircraft Technical Analyses group is also given and is the highest for autopilot/flight director, flight controls, instruments, and navigation. As possible causes, stress factors, electromagnetic compatibility and alpha and cosmic radiation are discussed. Author (ESA)

N83-32802# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France).
EVOLUTION OF LAUNCH VEHICLE AVIONICS
M. G. Salessy 1982 33 p In FRENCH Presented at CNES Colloq. Intern. sur l'Evolution des Moyens de Lancements Spatiaux en France, Paris, 19-21 Jan. 1982
(SNIAS-831-422-121) Avail: NTIS HC A03/MF A01

Slides which summarize a lecture on launch vehicle avionics are reproduced. Ariane 5 avionics needs are discussed. Improvements in systems reliability rather than in overall performance are expected. Increasing use of digital data busses is forecast. Author (ESA)

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N83-32803 Defence Research Information Centre, Orpington (England).

DURABILITY OF PROPELLER SHAFT INTERFERENCE FITS UNDER VARIABLE CYCLIC LOADING

A. S. Fedorov, E. M. Pasumanskii, and E. V. Birulya May 1983 13 p refs Transl. into ENGLISH of Sudostroenie (USSR), no. 6, 1977 p 22-25

(DRIC-T-6880; BR88015) Copyright. Avail: Issuing Activity

Fatigue phenomena in interference fits subjected to variable loads were studied on a model propeller shaft under varying cyclic bending stresses. An expression for durability up to 1000 million cycles for carbon steel shafts was derived. Results show that the number of cycles in one programmed loading block exerts only an insignificant influence on the relative durability. The number of stress amplitude levels in programmed loading does not affect the relative durability. Author (ESA)

N83-32804*# General Electric Co., Evendale, Ohio. Aircraft Engine Business Group.

V/STOL PROPULSION CONTROL ANALYSIS: PHASE 2, TASK 5-9

Nov. 1981 152 p refs

(Contract NAS3-22057)

(NASA-CR-165523; NAS 1.26:165523; R81AEG759) Avail: NTIS HC A08/MF A01 CSCL 21E

Typical V/STOL propulsion control requirements were derived for transition between vertical and horizontal flight using the General Electric RALS (Remote Augmented Lift System) concept. Steady-state operating requirements were defined for a typical Vertical-to-Horizontal transition and for a typical Horizontal-to-Vertical transition. Control mode requirements were established and multi-variable regulators developed for individual operating conditions. Proportional/Integral gain schedules were developed and were incorporated into a transition controller with capabilities for mode switching and manipulated variable reassignment. A non-linear component-level transient model of the engine was developed and utilized to provide a preliminary check-out of the controller logic. An inlet and nozzle effects model was developed for subsequent incorporation into the engine model and an aircraft model was developed for preliminary flight transition simulations. A condition monitoring development plan was developed and preliminary design requirements established. The Phase 1 long-range technology plan was refined and restructured toward the development of a real-time high fidelity transient model of a supersonic V/STOL propulsion system and controller for use in a piloted simulation program at NASA-Ames. Author

N83-32805*# National Aeronautics and Space Administration, Washington, D. C.

COMPARATIVE EVALUATION OF GAS-TURBINE ENGINE COMBUSTION CHAMBER STARTING AND STALLING CHARACTERISTICS FOR MECHANICAL AND AIR-INJECTION

I. N. Dyatlov Feb. 1983 12 p refs Transl. into ENGLISH from the book "Gorenie v Potoke" Kazan, USSR, 1970 p 160-169 Original language doc. announced as A71-28954 Transl. by Scientific Translation Service, Santa Barbara, Calif. Original doc. prep. by Kazanskiy Aviationny Inst., USSR

(NASA-TM-77024; NAS 1.15:77024) Avail: NTIS HC A02/MF A01 CSCL 21E

The effectiveness of propellant atomization with and without air injection in the combustion chamber nozzle of a gas turbine engine is studied. Test show that the startup and burning performance of these combustion chambers can be improved by using an injection during the mechanical propellant atomization process. It is shown that the operational range of combustion chambers can be extended to poorer propellant mixtures by combined air injection mechanical atomization of the propellant. S.L.

N83-32806*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

MODELING INTERFACE MOTION OF COMBUSTION (MINOC). A COMPUTER CODE FOR TWO-DIMENSIONAL, UNSTEADY TURBULENT COMBUSTION

Ahmed F. Ghoniem (California Univ., Berkeley), Cecil J. Marek, and Antoni K. Oppenheim (California Univ., Berkeley) Aug. 1983 19 p refs

(Grant NAG3-313)

(NASA-TP-2132; E-1569; NAS 1.60:2132) Avail: NTIS HC A02/MF A01 CSCL 21E

A computer code for calculating the flow field and flame propagation in a turbulent combustion tunnel is described. The model used in the analysis is the random vortex model, which allows the turbulent field to evolve as a fundamental solution to the Navier-Stokes equations without averaging or closure modeling. The program was used to study the flow field in a model combustor, formed by a rearward-facing step in a channel, in terms of the vorticity field, the turbulent shear stresses, the flame contours, and the concentration field. Results for the vorticity field reveal the formation of large-scale eddy structures in the turbulent flow downstream from the step. The concentration field contours indicate that most burning occurred around the outer edges of the large eddies of the shear layer. S.L.

N83-32807*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

COMPUTER CODE FOR OFF-DESIGN PERFORMANCE ANALYSIS OF RADIAL-INFLOW TURBINES WITH ROTOR BLADE SWEEP

Peter L. Meitner (Army Aviation Research and Development Command, St. Louis, Mo.) and Arthur J. Glassman Aug. 1983 26 p refs

(NASA-TP-2199; NAS 1.60:2199; AVRADCOM-TR-83-C-4) Avail: NTIS HC A03/MF A01 CSCL 21E

The analysis procedure of an existing computer program was extended to include rotor blade sweep, to model the flow more accurately at the rotor exit, and to provide more detail to the loss model. The modeling changes are described and all analysis equations and procedures are presented. Program input and output are described and are illustrated by an example problem. Results obtained from this program and from a previous program are compared with experimental data. Author

N83-32808*# Oklahoma State Univ., Stillwater.

AXIAL VANE-TYPE SWIRLER PERFORMANCE CHARACTERISTICS M.S. Thesis

Glenn Ferris Sander Jul. 1983 120 p refs

(Grant NAG3-74)

(NASA-CR-172995; NAS 1.26:172995) Avail: NTIS HC A06/MF A01 CSCL 21E

The performance of an axial vane-type swirler was investigated to aid in computer modeling of gas turbine combustor flowfields and in evaluation of turbulence models for swirling confined jet flow. The swirler studied is annular with a hub-to-swirler diameter ratio of 0.25 and ten adjustable vanes of pitch-to-chord ratio 0.68. Measurements of time-mean axial, radial, and tangential velocities were made at the swirler exit plane using a five-hole pitot probe technique with computer data reduction. Nondimensionalized velocities from both radial and azimuthal traverses are tabulated and plotted for a range of swirl vane angles phi from 0 to 70 degrees. A study was done of idealized exit-plane velocity profiles relating the swirl numbers S and S' to the ratio of maximum swirl and axial velocities for each idealized case, and comparing the idealized swirl numbers with ones calculated from measured profiles. Author

N83-32809*# National Aeronautics and Space Administration, Washington, D. C.
REAL-TIME SIMULATION OF JET ENGINES WITH DIGITAL COMPUTER. 1: FABRICATION AND CHARACTERISTICS OF THE SIMULATOR
Kenji Nishio, Nanahisa Sugiyama, Takeshi Koshinuma, Takeo Hashimoto, Toshimi Ohata, and Hideo Ichikawa Jun. 1983 61 p refs Transl. into ENGLISH of rept. NAL-TR-283 Tokyo, Jul. 1972 37 p Translation also announced as N73-15820 Transl. by Kanner (Leo Associates), Redwood City, Calif. Original doc. prep. by National Aerospace Lab., Tokyo
(Contract NASw-3541)
(NASA-TM-77081; NAS 1.15:77081) Avail: NTIS HC A04/MF A01 CSCL 21E

The fabrication and performance of a real time jet engine simulator using a digital computer are discussed. The use of the simulator in developing the components and control system of a jet engine is described. Comparison of data from jet engine simulation tests with actual engine tests was conducted with good agreement. Author

N83-32810*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PROPELLER PERFORMANCE AND WEIGHT PREDICTIONS APPENDED TO THE NAVY/NASA ENGINE PROGRAM
R. M. Plencner, P. Senty, and T. J. Wickenheiser Jul. 1983 41 p refs
(NASA-TM-83458; E-1773; NAS 1.15:83458) Avail: NTIS HC A03/MF A01 CSCL 21E

The Navy/NASA Engine Performance (NNEP) is a general purpose computer program currently employed by government, industry and university personnel to simulate the thermodynamic cycles of turbine engines. NNEP is a modular program which has the ability to evaluate the performance of an arbitrary engine configuration defined by the user. In 1979, a program to calculate engine weight (WATE-2) was developed by Boeing's Military Division under NASA contract. This program uses a preliminary design approach to determine engine weights and dimensions. Because the thermodynamic and configuration information required by the weight code was available in NNEP, the weight code was appended to NNEP. Due to increased emphasis on fuel economy, a renewed interest has developed in propellers. This report describes the modifications developed by NASA to both NNEP and WATE-2 to determine the performance, weight and dimensions of propellers and the corresponding gearbox. The propeller performance model has three options, two of which are based on propeller map interpolation. Propeller and gearbox weights are obtained from empirical equations which may easily be modified by the user. Author

N83-32811*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CURRENT AND FUTURE TECHNOLOGY IN RADIAL AND AXIAL GAS TURBINES
H. E. Rohlik 27 Aug. 1983 45 p refs Presented at Seminar on Fluid Dyn. of Turbomachinery, Ames, Iowa, 18-27 Jul. 1983; sponsored by ASME
(NASA-TM-83414; E-1702; NAS 1.15:83414) Avail: NTIS HC A03/MF A01 CSCL 21E

Design approaches and flow analysis techniques currently employed by aircraft engine manufacturers are assessed. Studies were performed to define the characteristics of aircraft and engines for civil missions of the 1990's and beyond. These studies, coupled with experience in recent years, identified the critical technologies needed to meet long range goals in fuel economy and other operating costs. Study results, recent and current research and development programs, and an estimate of future design and analytic capabilities are discussed. Author

N83-32812# Tennessee Univ. Space Inst., Tullahoma. Dept. of Aerospace and Mechanical Engineering.
UNSTEADY SWIRLING FLOWS IN GAS TURBINES Final Technical Report, 1 Apr. 1978 - 31 Dec. 1982
M. Kurosaka Mar. 1983 16 p refs
(Contract F49620-78-C-0045; AF Proj. 2307)
(AD-A128386; AFOSR-83-0426TR) Avail: NTIS HC A02/MF A01 CSCL 21/5

The overall objective was to acquire fundamental understanding of phenomena characterized by violent fluctuation induced by swirling flow - the 'vortex whistle', often found to occur in various aircraft engine components. By conducting a comprehensive and systematic investigation into the 'vortex whistle', it was intended to achieve the following specific goals: (1) by performing analysis to predict the frequency of the vortex whistle and verifying it against the experimental results, one can detune the natural frequencies of engine components away from it in order to ensure their structural integrity, and (2) by appealing to the mechanism of acoustic streaming induced by the vortex whistle, we explained, through both analysis and experiment, the transformation of steady radial profile - in particular the total temperature separation or the Ranque-Hilsch tube effect; the implications of this are that the radial distortion of the flow field may have strong bearing on the 'steady' aero data obtained in the swirling flow environment of gas turbines. Author (GRA)

N83-32733# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
TESTS FOR INLET DISTORTION IN A TWO-SPOOL TURBOJET ENGINE ON THE GROUND TEST BED
Jiang Feng (Shenyang Liming Machinery Co.) *In its* Acta Aeron. et Astronautica Sinica (FTD-ID(RS)T-0664-82) 4 Mar. 1983 p 113-133 refs Transl. into ENGLISH from Hang Kong Xuebao (China), v. 2, no. 1, 1981 21 p (For primary document see N83-32727 21-01)
Avail: NTIS HC A10/MF A01 CSCL 21/5

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N83-32720# Air Force Systems Command, Wright-Patterson AFB, Ohio.
A PROGRAM SYSTEM FOR DYNAMIC ANALYSIS OF AERONAUTICAL STRUCTURES, HAJIF-II TEAM FOR DEVELOPING HAJIF-II
Guan Dd *In its* Acta Aeron. et Astronautica Sinica (FTD-ID(RS)T-1605-82) 4 Mar. 1983 p 40-54a refs Transl. into ENGLISH from Hang Kong Xuebao (China), v. 3, no. 3, Sep. 1982 p 25-31 (For primary document see N83-32717 21-01)
Avail: NTIS HC A08/MF A01 CSCL 01/3

N83-32721# Air Force Systems Command, Wright-Patterson AFB, Ohio.
SYSTEM IDENTIFICATION AND AIRCRAFT FLUTTER
Zhang Lingmi *In its* Acta Aeron. et Astronautica Sinica (FTD-ID(RS) T-1605-82) 4 Mar. 1983 p 55-68a refs Transl. into ENGLISH from Hang Kong Xuebao (China), v. 3, no. 3, Sep. 1982 p 33-40 (For primary document see N83-32717 21-01)
Avail: NTIS HC A08/MF A01 CSCL 01/3

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N83-32813# Federal Aviation Administration, Washington, D.C. Program Engineering and Maintenance Service.

STATE OF THE ART SURVEY ON CONFINED BASE COURSES FOR UTILITY AIRPORT PAVEMENTS Final Report
Aston L. McLaughlin Apr. 1983 30 p refs
(FAA-PM-83-24) Avail: NTIS HC A03/MF A01

The state of the art in the use of confining methods for loose on-site materials as a stabilizing medium for utility airport pavements are reviewed. Much field experimentation on expedient types of pavements is in progress but a theoretical base was not yet developed for predicting performance. It is shown that well developed specifications exist for membrane encapsulated soil layer systems, but none exists for sand-filled cellular systems. Experimentation points to certain problems that must be corrected before sandfilled systems can be used for civil aircraft pavements. Recommendations are offered that could provide a predictive methodology. S.L.

N83-32814# National Aeronautical Establishment, Ottawa (Ontario). Unsteady Aerodynamics Lab.
MEASUREMENT OF DIRECT MOMENT DERIVATIVES IN THE PRESENCE OF STING PLUNGING
M. E. Beyers Jan. 1983 27 p refs In ENGLISH; FRENCH summary
(AD-A127637; NRC-20935; NAE-AN-1) Avail: NTIS HC A03/MF A01 CSCL 20/4

This paper presents a review and extension of methods for determining the effects of sting oscillations on the measurement of dynamic moment derivatives, based on linear as well as nonlinear models. It is shown that two of the linearized methods will reduce to the same result, applicable to low-lift configurations and suitable for on-line data reduction. The location of the effective axis of rotation is determined for a model executing planar oscillations in two degrees of freedom. The equations for the effect of plunging on the derivatives due to angular oscillation can be simplified by relating the sting deflection parameters to the co-ordinate of this axis. Therefore, both the correction of the measured derivatives and their transformation to the reference center can be accomplished after a single measurement is made, namely the location of the effective axis. The requirements for performing sting plunging corrections for aircraft configurations at high angles of attack are discussed. Author (GRA)

N83-32815# Arbeitsgemeinschaft Deutscher Verkehrsflughaefen, Stuttgart (West Germany).
GUIDELINES FOR THE PLANNING AND DIMENSIONING OF GENERAL AVIATION INSTALLATIONS ON TRAFFIC AIRPORTS [LEITSAETZ FUER DIE PLANUNG UND BEMESSUNG VON ANLAGEN DER ALLGEMEIN LUFTFAHRT AUF VERTK-HRSFLUGHAEFEN]
Gerd-Dieter Schmidt Jan. 1982 66 p refs In GERMAN
(ISBN-3-87977-049-2) Avail: NTIS HC A04/MF A01

Planning and infrastructure of airport installations were reviewed in order to provide general guidelines. General aviation contains the complete civil aviation except line and charter aviation. The increasing importance of business trips and working traffic requires more and more from airport installation. Common dispatching in line and charter aviation installations can lead to complicated traffic handling. Separate general aviation terminals and parking places, and partly separate runways are useful. Additional security measures have to be considered. Statistics of existing installations are presented. Author (ESA)

N83-32816# Societe Nationale Industrielle Aerospatiale, Paris (France).
CLIENT-TEST LABORATORY RELATIONS [LES RELATIONS CLIENTS-LABORATOIRES D'ESSAIS]
M. Rosenau 1982 8 p In FRENCH Presented at 7th Journees Sci. et Tech. de l'ASTE 1, Paris, 12-13 Oct. 1982
(SNIAS-831-422-107) Avail: NTIS HC A02/MF A01

All services expected from a testing laboratory must be clearly and completely defined. A viable dialog is necessary for establishing test documents, techniques, and costs. The services required can be written by the client or prepared with the tester if the client does not know what must be done to demonstrate the quality of the test item. Test objectives; norms; material to be tested; conditions for mounting and safety; measurement and verification; presentation of results; and various practical information obtained are considered. Documentation to be provided to and by the testing laboratory, data acquisition procedures, test sequences, and client-tester relations are discussed. Transl. by A.R.H.

N83-32729# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
EXPERIMENTAL INVESTIGATION OF INTERFERENCES OF TOP AND BOTTOM SLOTTED WALLS AND THE EFFECTS OF SIDEWALLS IN A TRANSONIC AIRFOIL WIND TUNNEL
In its Acta Aeron. et Astronautica Sinica (FTD-ID(RS)T-0664-82) 4 Mar. 1983 p 17-37 refs Transl. into ENGLISH from Hang Kong Xuebao (China), v. 2, no. 1, 1981 21 p (For primary document see N83-32727 21-01)
Avail: NTIS HC A10/MF A01 CSCL 14/2

N83-32739# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SEVERAL PROBLEMS IN THE DESIGN OF ENVIRONMENTAL WIND TUNNELS
Fu Zhifu *In its* Mech. and Practice (Selected Articles) 28 Mar. 1983 p 1-14 Transl. into ENGLISH from Lixue yu Shijian (China), v. 4, no. 3, 1982 p 19-23 (For primary document see N83-32738 21-01)
Avail: NTIS HC A03/MF A01 CSCL 14/2

N83-32741# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE OPTICAL OIL FLOW TECHNIQUE IN A SHOCK WAVE WIND TUNNEL
Yang Zuqing and Wang Xirong *In its* Mech. and Practice (Selected Articles) 28 Mar. 1983 p 26-27 Transl. into ENGLISH from Lixue yu Shijian (China), v. 4, no. 3, 1982 p 78-81 (For primary document see N83-32738 21-01)
Avail: NTIS HC A03/MF A01 CSCL 14/2

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N83-32817# Committee on Science and Technology (U. S. House).
ASTRONAUTS AND COSMONAUTS BIOGRAPHICAL AND STATISTICAL DATA
Marcia S. Smith Washington GPO 1983 339 p Rept. presented to the Comm. on Sci. and Technol., 98th Congr., 1st Sess., Apr. 1983 Revised Prepared by Congressional Research Service, Library of Congress
(GPO-19-606) Avail: HC SOD

National Aeronautics and Space Administration Astronauts, U.S. payload specialists and passengers, the X-15, X-20 Dyna-Soar and Manned Orbiting Laboratory Programs, Soviet cosmonauts, non-U.S., non U.S.S.R. spacenauts, and comparative data on American and Soviet spaceflights are tabulated. Author

N83-32818# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
JOURNAL OF CHINESE SOCIETY OF ASTRONAUTICS (SELECTED ARTICLES)
10 Mar. 1983 52 p refs Transl. into ENGLISH from Yuhang Xuebao (China), no. 3, 1982 p 57-89
(AD-A127842; FTD-ID(RS)T-0084-83) Avail: NTIS HC A04/MF A01 CSCL 22/1

Calculation of minimum entry heat transfer shape of a space vehicle, and limit analysis of the structural strength for the combustion chambers of a liquid rocket engine are presented. For individual titles, see N83-32819 through N83-32820.

N83-32819# Air Force Systems Command, Wright-Patterson AFB, Ohio.
CALCULATION OF MINIMUM ENTRY HEAT TRANSFER SHAPE OF A SPACE VEHICLE c18
Zhou Qi Cheng *In its* J. of Chinese Society of Astronautics (selected articles) (FTD-ID(RS)T-0084-83) 10 Mar. 1983 p 1-17 refs Transl. into ENGLISH from Yuhang Xuebao (China), no. 3, 1982 17 p (For primary document see N83-32818 21-12)
Avail: NTIS HC A04/MF A01 CSCL 22/2

The well known boundary layer heat transfer relation was used first to derive the expressions of the total heat flow rate on the surface of the spacecraft and the total heat added during the entire re-entry process. Then, with the aid of some numerical results, the flow field and the Prandtl-Meyer expansion theory, the minimum re-entry heat transfer shape under specified fineness ratio and total vehicle weight conditions could be obtained using a variational method. Finally, the effect of the drag coefficient on the minimum re-entry heat transfer shape was analyzed. The calculated results indicated that: For a given total vehicle weight and specified fineness ratio, the total heat transfer decreased with increasing drag coefficient. The minimum re-entry heat transfer shape is a cylinder with a flat nose. Author

N83-32820# Air Force Systems Command, Wright-Patterson AFB, Ohio.
LIMIT ANALYSIS OF THE STRUCTURAL STRENGTH FOR THE COMBUSTION CHAMBER OF A LIQUID ROCKET ENGINE c20
In its J. of Chinese Society of Astronautics (selected articles) (FTD-ID(RS)T-0084-83) 10 Mar. 1983 p 18-47 refs Transl. into ENGLISH from Yuhang Xuebao (China), no. 3, 1982 30 p (For primary document see N83-32818 21-12)
Avail: NTIS HC A04/MF A01 CSCL 22/1

An example of the limit analysis method in mechanics is provided. It provided computational formulas for the limiting load of the major parts in the combustion chamber of a liquid rocket engine. These calculated results have good engineering accuracy in approximation through experimental verification. Author

N83-32821# Oesterreichische Akademie der Wissenschaften, Vienna. Inst. fuer Weltraumforschung.
STUDY OF LOW ENERGY ELECTRON FLUX AND ITS REACTION TO ACTIVE EXPERIMENTATION ON SPACELAB Final Report
R. Schmidt, W. Riedler, E. Ofner, W. Ramsauer, K. Schwingenschuh, and N. Valavanoglou Jan. 1982 74 p In GERMAN Prepared in cooperation with Graz Univ.
(IWF-8203) Avail: NTIS HC A04/MF A01

The construction of a fluxgate-magnetometer and its microprocessor unit are presented. The specifications of both are given. The microprocessor software is explained. The interface circuits between magnetometer and Spacelab onboard computer are described. The magnetometer test procedures are successful and the experimental setup is ready to be incorporated. Author (ESA)

N83-33458# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany).
TECHNICAL ASPECTS OF MATERIALS SCIENCE EXPERIMENTS ON SOUNDING ROCKETS
B. Franke *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 373-378 (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

N83-33459# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany).
THE GERMAN SOUNDING ROCKET PROGRAM TEXUS
D. Faust *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 379-386 (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

N83-33460# Swedish Space Corp., Solna.
MATERIALS SCIENCE EXPERIMENTS IN SWEDEN, SOUNDING ROCKETS: GET AWAY SPECIAL (GAS), SPACE SHUTTLE
R. Joensson, S. Wallin, P. Holm, and E. Soederdahl *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 387-393 refs (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

N83-32822# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
ORBIT DETERMINATION OF LAGEOS AND STARLETTE AND THE POSITION ESTIMATION OF THE EUROPEAN LASER TRACKING STATIONS AT KOOTWIJK, WETTZELL, GRASSE AND METSAHOVI
K. F. Wakker and B. A. C. Ambrosius Jan. 1983 43 p Presented at 3rd Crustal Dyn. Group Meeting, Albuquerque, 28-29 Oct. 1982 and 3rd Intern. Symp. on the Use of Artificial Satellites for Geodesy and Geodyn., Athens, 20-25 Sep. 1982
(VTH-M-455) Avail: NTIS HC A03/MF A01

The positions of the European laser tracking stations were determined by separately processing LAGEOS and STARLETTE five-day and two-revolution data arcs. Range residual rms's and the recovered apparent range and timing biases of the five-day arc solutions are reported. Mutual differences between LAGEOS and STARLETTE solutions for station positions are given. Discrepancies between European, NASA, and Texas University baselines and solutions are discussed. Author (ESA)

N83-32823# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
NUMERICAL EXPERIMENTS ON THE ESTIMATION OF RELATIVE STATION POSITIONS USING SINGLE PASSES OF LAGEOS AND STARLETTE LASER RANGE OBSERVATIONS
H. J. D. Piersma, K. F. Wakker, and B. A. C. Ambrosius Jan. 1983 16 p Presented at 3rd Crustal Dyn. Working Group Meeting, Albuquerque, 28-29 Oct. 1982
(VTH-M-456) Avail: NTIS HC A02/MF A01

A semigeometric data reduction mode, in which relative station positions are determined from a number of single satellite passes where the stations track the satellite almost simultaneously was assessed for use in satellite observation of tectonic movement. One European, and two American networks were used. For each network the coordinates of 4 out of the 5 stations were determined, while the coordinates of a base station were held fixed at the University of Texas UT 8112.2 solution. Comparing the station coordinate solutions with the Texas solution shows that coordinate errors of many meters are possible. The most accurate interstation baselines are obtained for the network in which at least four stations track LAGEOS simultaneously. Taking into account that most of the adjusted baselines show relatively large formal standard deviations, no significant deviation from the Texas baselines solution is found. Author (ESA)

N83-32824# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
PRECISE ORBIT DETERMINATION FOR ERS-1
K. F. Wakker and B. A. C. Ambrosius Mar. 1983 52 p Presented at ESOC 2nd Study Progress Meeting, 22 Feb. 1983
(Contract ESOC-5227/82/D-IM(SC))
(VTH-M-459) Avail: NTIS HC A04/MF A01

Orbit characteristics and major perturbing forces acting on ERS-1 were studied. Major dynamic error sources are Earth's magnetic field, atmospheric drag, and solar and Earth radiation. For laser, TRANET and PRARE tracking systems, measurement accuracy and instantaneous station position accuracy (in inertial space) were investigated. Orbital differences were calculated for gravity, atmospheric, and albedo models. An error model was

derived. The contributions of individual error sources to satellite position errors were computed for a 3 day and an 11 min data arc. Author (ESA)

N83-32825# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
ERS-1 ORBIT DETERMINATION FROM LASER, TRANET, AND PRARE TRACKING DATA
K. F. Wakker and B. A. C. Ambrosius 1983 48 p Presented at NATO Workshop on Satellite Altimetry and Ocean Circulation, San Miniato, 11-14 Apr. 1983
(Contract ESOC-5227/82/D-IM(SC))
(VTH-M-464) Avail: NTIS HC A03/MF A01

An error model for ERS-1 orbit determination was derived and was used for covariance analyses of 3-day, 2-revolution, and 15-min data arcs. For the 3-day and 2-revolution arcs, laser range and TRANET 2 range rate tracking concepts were studied. Laser and PRARE range tracking concepts were studied using a 15-min arc. To enable the computation of accurate orbits a tailored gravity model should be developed from ERS-1 tracking data acquired during the first months in orbit. For the 3-day arc the full 14-stations laser network leads to essentially the same orbit accuracy as the 45-stations TRANET network. For the error model considered a reduction of the number of tracking stations to 5 hardly deteriorates the radial orbit accuracy. To derive accurate dynamic models a dense tracking network is required during the initial mission phase. Author (ESA)

N83-33266# Meteorological Satellite Center, Tokyo (Japan).
ORBIT PREDICTION FOR TIROS-N SATELLITE SERIES
Shinobu Nakajima and Tadao Aoki *In its* Sum. of TOVS Data Process. System Mar. 1983 p 49-55 ref In JAPANESE; ENGLISH summary (For primary document see N83-33262 21-42)
Avail: NTIS HC A08/MF A01

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air).*

N83-33429# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Hauptabt. Angewandte Datentechnik.
MOBILE ROCKET BASE (MORABA) PRESENTATION
R. Klein *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 195-199 (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

N83-33431# Swedish Space Corp., Kiruna.
ESRANGE, THE SWEDISH HIGH LATITUDE SOUNDING ROCKET, BALLOON AND SATELLITE FACILITY
Arne Helger *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 205-207 (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

N83-33433# Swedish Space Corp., Kiruna.
NEW INSTALLATIONS AND EQUIPMENT AT ESRANGE
Gunnar Larsson *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 211-212 (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

N83-33449# Space Vector Corp., Northridge, Calif.
A NEW APPROACH TO LAUNCHING ARIES SOUNDING ROCKETS
Robert E. Scarboro and Edward F. McKenna (AFGL, Hanscom AFB, Mass.) *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 323-328 (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

N83-33450# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
THE RANGE SAFETY CONCEPT FOR CONESTOGA 1
Gottfried Schneiders and Andy Spencer *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 329-332 (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N83-32826*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
MODAL ANALYSIS OF A NONUNIFORM STRING WITH END MASS AND VARIABLE TENSION
Mario H. Rheinfurth and Zachary J. Galaboff Aug. 1983 24 p refs
(NASA-TP-2198; NAS 1.60:2198) Avail: NTIS HC A02/MF A01 CSCL 20K

Modal synthesis techniques for dynamic systems containing strings describe the lateral displacements of these strings by properly chosen shape functions. An iterative algorithm is provided to calculate the natural modes of a nonuniform string and variable tension for some typical boundary conditions including one end mass. Numerical examples are given for a string in a constant and a gravity gradient force field. S.L.

N83-32827# Committee on Science and Technology (U. S. House).
COMMERCIALIZATION OF LAND AND WEATHER SATELLITES
Patricia E. Humphlett Washington GPO Jun. 1983 361 p refs Presented to the Subcomm. on Space Sci. and Appl. and the Subcomm. on Natural Resources, Agr. Res. and Environ. of the Comm. on Sci. and Technol., 98th Congr., 1st Sess., Jun. 1983 Prepared by the Library of Congr., Congr. Res. Serv.
(GPO-21-061) Avail: Subcommittee on Space Science and Applications

The transfer of the civil land remote sensing system (LANDSAT), the civil weather satellite system, and future ocean observing systems to the private sector is evaluated. A process through which transfer proposals will be requested from the private sector to help determine the feasibility of transferring all or part of these systems to the private sector has begun. This course of action is based in part on the theory that private enterprise is the driving force of the economy and that the Government should not compete with the private sector. Accordingly, the Government should, whenever possible, buy products and services from the private sector, especially when this leads to greater efficiency and cost savings. The Federal Government has never intended to own and operate a commercial land remote sensing system. There has been little objection to the eventual transfer of LANDSAT to the private sector once its operational capability was proven and a commercial market was developed. The idea of transferring weather satellites is, however, relatively new and has generated some controversy. The initial congressional response was somewhat negative with concerns being raised. S.L.

N83-32828*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
PERFORMANCE REQUIREMENTS ANALYSIS FOR PAYLOAD DELIVERY FROM A SPACE STATION

A. L. Friedlander (Science Applications, Inc.), J. K. Soldner (Science Applications, Inc.), J. Bell, ed., G. W. Ricks, R. E. Kincade, D. DeAtkins, R. Reynolds, B. A. Nader, O. Hill, G. R. Babb et al Jul. 1983 228 p refs
(NASA-RP-1110; S-523; NAS 1.61:1110) Avail: NTIS HC A11/MF A01 CSCL 22B

Operations conducted from a space station in low Earth orbit which have different constraints and opportunities than those conducted from direct Earth launch were examined. While a space station relieves many size and performance constraints on the space shuttle, the space station's inertial orbit has different launch window constraints from those associated with customary Earth launches which reflect upon upper stage capability. A performance requirements analysis was developed to provide a reference source of parametric data, and specific case solutions and upper stage sizing trade to assist potential space station users and space station and upper stage developers assess the impacts of a space station on missions of interest. E.A.K.

N83-32829*# National Aeronautics and Space Administration, Washington, D. C.
UNIAXIAL AERODYNAMIC ATTITUDE CONTROL OF ARTIFICIAL SATELLITES
V. V. Sazonov May 1983 30 p refs Transl. into ENGLISH of "Odnoosnaya Aerodinamicheskaya Oriyentatsiya Iskusstvennykh Sputnikov" rept. Pr-151 Moscow, 1982 27 p Transl. by Scientific Translation Service, Santa Barbara, Calif. Original doc. prep. by Inst. of Applied Mathematics, Academy of Sciences (USSR), Moscow
(Contract NASw-3542)
(NASA-TM-77217; NAS 1.15:77217; Pr-151) Avail: NTIS HC A03/MF A01 CSCL 22B

Within the context of a simple mechanical model the paper examines the movement of a satellite with respect to the center of masses under conditions of uniaxial aerodynamic attitude control. The equations of motion of the satellite take account of the gravitational and restorative aerodynamic moments. It is presumed that the aerodynamic moment is much larger than the gravitational, and the motion equations contain a large parameter. A two-parameter integrated surface of these equations is constructed in the form of formal series in terms of negative powers of the large parameter, describing the oscillations and rotations of the satellite about its lengthwise axis, approximately oriented along the orbital tangent. It is proposed to treat such movements as nominal undisturbed motions of the satellite under conditions of aerodynamic attitude control. A numerical investigation is made for the above integrated surface. Author

N83-32830# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Unternehmensbereich Apparate.
RELIABILITY: CONCEPT, STRUCTURE, ANALYSIS, DEMONSTRATION [ZUVERLAESSIGKEIT: BEGRIFFE, STRUKTUR, ANALYSE, NACHWEIS]
Hans-Hermann Molter 1 Sep. 1982 24 p refs In GERMAN
(MBB-UA-665-82-O) Avail: NTIS HC A02/MF A01

The reliability of guided missiles was investigated. The reliability concept is defined as having an exponential probability distribution, the characteristics of which are given. Redundance of units is useful if the utilization time is small with respect to the average lifetime without redundant components. Life cycle reliability is essentially determined by the missile storage reliability. Requirements for securing reliability and long term storage capability are analyzed. Organizational measures for reliability are presented. Risks involved with storage and methods to demonstrate reliability are given. Software reliability is also treated. Author (ESA)

N83-32831# European Space Agency, Noordwikj (Netherlands).
REPORT ON THE SCIENTIFIC SATELLITES OF THE EUROPEAN SPACE AGENCY
W. R. Burke, ed., K. Bennett, comp., P. Benvenuti, comp., V. Domingo, comp., R. J. Emery, comp., T. deGraauw, comp., K. Knott, comp., F. Macchetto, comp., R. G. Marsden, comp., D. E. Page, comp. et al May 1983 87 p Original contains color illustrations
Avail: NTIS HC A05/MF A01

The missions and status of Cos-B Geos 1 and 2, ISEE, and IUE are outlined. The first Spacelab payload; EXOSAT; and the International Solar Polar Mission are described. The ESA contribution to the Space Telescope program; the Hipparcos astrometry program; the Giotto Halley's Comet mission; and the Infrared Space Observatory project are described. Author (ESA)

N83-32832# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France). Div. des Systemes Balistiques et Spatiaux.
MULTIPURPOSE COMMUNICATION SATELLITES
F. Caneparo 1982 26 p Presented at ENKOR '82, Seoul, Nov. 1982
(SNIAS-831-422-102) Avail: NTIS HC A03/MF A01

A medium size satellite based on the ARABSAT design, and a large satellite based on TDF and TV-SAT are presented. The standard subsystems are sketched and typical missions are suggested. Author (ESA)

N83-32833# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France). Div. des Systemes Balistiques et Spatiaux.
COMMERCIAL COMMUNICATION SATELLITES IN THE NEXT 20 YEARS
Francois J. Turck 1982 22 p Presented at a Conf., Baltimore, 26 May 1982
(SNIAS-831-422-117) Avail: NTIS HC A02/MF A01

Demand for global satellite systems such as INTELSAT, export systems such as ARABSAT, and satellites for countries with a well developed aerospace industry is predicted. Problems concerning frequency allocation and geostationary orbit overcrowding are reviewed. The merits of small satellites versus large space platforms are discussed. Up to 475 satellites and 5 platforms are expected to be launched by the year 2000, excluding Soviet spacecraft. Author (ESA)

N83-32834# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France). Div. des Systemes Balistiques et Spatiaux.
PRELIMINARY EXPLORATORY WORK ON FUTURE LAUNCHERS [PREMIERS TRAVAUX PROSPECTIFS SUR LES SYSTEMES DE LANCEMENTS FUTURS]
M. Villain 1982 20 p In FRENCH Presented at CNES Colloq. Intern sur l'Evolution des Moyens de Lancements Spatiaux en France, Paris, 19-21 Jan. 1981
(SNIAS-831-422-123) Avail: NTIS HC A02/MF A01

A two stage, recoverable, reusable launch vehicle for European space programs is discussed. Horizontal and vertical takeoff, and rocket and air breathing propulsion were considered. With vertical takeoff and a reusable (rocket) first stage, a 10 ton payload can be put into low Earth orbit with a takeoff weight of 290 tons, if the upper stage is also reusable (ballistic reentry). A 15 ton payload can be carried if the second stage is not recovered. Four engines, each developing 1000 kN thrust are required. Author (ESA)

N83-33415# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany).
E2: A HEAVY CLEAN PAYLOAD OF THE ENERGY BUDGET CAMPAIGN
G. Hummeltenberg *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 111-114 (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

N83-33451# Instituto de Atividades Espaciais, Sao Jose dos Campos (Brazil). Centro Tecnico Aeroespacial.
SONDA 3 OPERATIONAL BRAZILIAN SOUNDING ROCKET
J. Boscov and B. M. Furlan *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 333-339 refs (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

N83-33453# Space Vector Corp., Northridge, Calif.
COMPUTER BASED ATTITUDE CONTROL SYSTEMS FOR

SOUNDING ROCKETS USING TUNED ROTOR GYROS
Stewart D. Lyon and Richard O. Rasmussen *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 349-353 refs (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

N83-33457# Queens Univ., Belfast (Northern Ireland). Dept. of Pure and Applied Physics.
SOUNDING ROCKET ATTITUDE DETERMINATION FROM ON BOARD MAGNETOMETER AND TELEMETRY SIGNAL POLARISATION DATA
D. P. Murtagh, R. G. H. Greer, and I. C. McDade *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 365-369 refs Sponsored by Northern Ireland Dept. of Education (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

N83-33468# Hamburg Univ. (West Germany).
THE FUTURE OF MATERIALS SCIENCE ON SOUNDING ROCKET FLIGHTS
H. Ahlborn *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 447-448 (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

N83-33469# Max-Planck-Institut fuer Aeronomie, Katlenburg-Lindau (West Germany).
MAGNETOSPHERIC SOUNDING ROCKET PROGRAM AT HIGH LATITUDES
K. Wilhelm *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 455-457 (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

N83-33490# Japan Meteorological Agency, Tokyo.
THE MODIFICATION OF THE OPERATIONAL PROGRAM FOR GMS-2
Junichi Nose, Yasukiyo Momoi, Takehisa Sakai (Science and Technology Agency), and Koichi Kimura *In* Meteorological Satellite Center Meteorol. Satellite Center Tech. Note, No. 7, 1983 Mar. 1983 p 47-52 In JAPANESE; ENGLISH summary (For primary document see N83-33485 21-47)
Avail: NTIS HC A06/MF A01

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

N83-32835*# National Aeronautics and Space Administration, Washington, D. C.
SAFETY POLICY AND REQUIREMENTS FOR PAYLOADS USING THE SPACE TRANSPORTATION SYSTEM (STS)
[1982] 24 p
(NASA-TM-85402; NHB-1700.7A; NAS 1.15:85402) Avail: NTIS HC A02/MF A01 CSCL 22A

The Space Transportation Operations (STO) safety policy is to minimize STO involvement in the payload and its GSE (ground support equipment) design process while maintaining the assurance of a safe operation. Requirements for assuring payload mission success are the responsibility of the payload organization and are beyond the scope of this document. The intent is to provide the overall safety policies and requirements while allowing for negotiation between the payload organization and the STO operator in the method of implementation of payload safety. This revision provides for a relaxation in the monitoring requirements for inhibits, allows the payload organization to pursue design options and reflects, additionally, some new requirements. As of the issue date of this NHB, payloads which have completed the formal safety assessment reviews of their preliminary design on the basis of the May 1979 issue will be reassessed for compliance with the above changes. Author

N83-32836# Lockheed Missiles and Space Co., Sunnyvale, Calif.
AEROELASTIC STABILITY ANALYSIS OF THE NEW SRB CABLE TRAY Final Technical Report
Lars E. Ericsson and J. Peter Reding May 1983 145 p refs Prepared for Martin Marietta Corp., New Orleans
(LMSC-D059412) Avail: NTIS HC A07/MF A01

An aeroelastic stability analysis of the space shuttle cable trays was performed to determine the effect of design modifications of the SRB cable tray and support configuration. A full analysis including the coupling between Karman vortex shedding and the cable tray motion was needed in order to determine if the structural integrity of the SRB cable tray could be assured without use of protective flow ramps. The analysis shows that it is possible that the ramps can be removed, but that experimental aerodynamic results for the SRB cable tray geometry are needed before the analysis can give a more definitive answer. S.L.

N83-32837*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
SPACE SHUTTLE OPERATIONAL LOGISTICS PLAN
Jesse W. Botts Aug. 1983 19 p
(NASA-TM-85410; K-SMO-12.01; NAS`1.15:85410) Avail: NTIS HC A02/MF A01 CSCL 22A

The Kennedy Space Center plan for logistics to support Space Shuttle Operations and to establish the related policies, requirements, and responsibilities are described. The Directorate of Shuttle Management and Operations logistics responsibilities required by the Kennedy Organizational Manual, and the self-sufficiency contracting concept are implemented. The Space Shuttle Program Level 1 and Level 2 logistics policies and requirements applicable to KSC that are presented in HQ NASA and Johnson Space Center directives are also implemented. Author

N83-32838*# Lockheed Engineering and Management Services Co., Inc., Houston, Tex.
COLUMBIA: THE FIRST FIVE FLIGHTS ENTRY HEATING DATA SERIES. VOLUME 4: THE LOWER WINDWARD WING 50 PERCENT AND 80 PERCENT SEMISPANS Final Report
S. D. Williams May 1983 515 p refs
(Contract NAS9-15800)
(NASA-CR-171666; NAS 1.26:171666; LEMSCO-19346-Vol-4) Avail: NTIS HC A22/MF A01 CSCL 22A

Entry heating flight data and wind tunnel data on the lower wing 50% and 80% Semi-Spans are presented for the first five flights of the Space Shuttle Orbiter. The heating rate data is presented in terms of normalized film heat transfer coefficients as a function of angle-of-attack, Mach number, and Normal Shock Reynolds number. The surface heating rates and temperatures were obtained via the JSC NONLIN/INVERSE computer program. Time history plots of the surface heating rates and temperatures are also presented. Author

N83-32839*# Lockheed Engineering and Management Services Co., Inc., Houston, Tex.
COLUMBIA: THE FIRST FIVE FLIGHTS ENTRY HEATING DATA SERIES. VOLUME 3: THE LOWER WINDWARD SURFACE CENTERLINE Final Report
S. D. Williams May 1983 557 p refs
(Contract NAS9-15800)
(NASA-CR-171665; NAS 1.26:171665; LEMSCO-19346-Vol-3) Avail: NTIS HC A24/MF A01 CSCL 22B

Entry heating flight data and wind tunnel data on the lower surface centerline are presented in terms of normalized film heat transfer coefficients as a function of angle-of-attack, Mach number, and Normal Shock Reynolds number. The surface heating rates and temperatures were obtained via the JSC NONLIN/INVERSE computer program. Time history plots of the surface heating rates and temperatures are also presented. Author

N83-32840*# Chrysler Corp., New Orleans, La. Electronics Div.
AEROTHERMODYNAMIC DATA BASE. DATA FILE CONTENTS REPORT, PHASE C Quarterly Report, Apr. - Jun. 1983
G. Richard Lutz 10 Jul. 1983 412 p
(Contract NAS9-16283)
(NASA-CR-171693; NAS 1.26:171693; DMS-DFR-2095) Avail: NTIS HC A18/MF A01 CSCL 22B

Space shuttle aerothermodynamic data, collected from a continuing series of wind tunnel tests, are permanently stored with the Data Management Services (DMS) system. Information pertaining to current baseline configuration definition is also stored. Documentation of DMS processed data arranged sequentially and by space shuttle configuration is listed to provide an up-to-date record of all applicable aerothermodynamic data collected, processed, or summarized during the space shuttle program. Tables provide survey information to the various space shuttle managerial and technical levels. A.R.H.

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

N83-32841# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France). Div. des Systemes Balistiques et Spatiaux.
TELEMETRY OF FRENCH BALLISTIC MISSILES AND LAUNCHERS [LES TELEMESURES SUR LES MISSILES BALISTIQUES ET LES LANCEURS FRANCAIS: EVOLUTION AND PERSPECTIVE]
Bernard Pieters 1982 29 p In FRENCH Presented at ADERA Conf. on La Telemesure et la Gestion des Grands Systemes, Bordeaux, 12-14 Oct. 1982
(SNIAS-831-422-108) Avail: NTIS HC A03/MF A01

French ballistic missile and launcher programs from 1960 onwards are reviewed. Onboard measurement, the measurement chain, and telemetry standards (including PCM) and technological evolution in the 1980's and beyond are covered. Programmable conditioners, fiber optics, increased reliability through redundancy, and electrical insulation are treated. Author (ESA)

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support.* For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics.*

N83-32819# Air Force Systems Command, Wright-Patterson AFB, Ohio.
CALCULATION OF MINIMUM ENTRY HEAT TRANSFER SHAPE OF A SPACE VEHICLE
Zhou Qi Cheng *In its* J. of Chinese Society of Astronautics (selected articles) (FTD-ID(RS)T-0084-83) 10 Mar. 1983 p 1-17 refs Transl. into ENGLISH from Yuhang Xuebao (China), no. 3, 1982 17 p (For primary document see N83-32818 21-12)
Avail: NTIS HC A04/MF A01 CSCL 22/2

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

N83-33411# Studien G.m.b.H., Freiburg (West Germany).
ROCKET-BORNE INSTRUMENTS IN THE EUV-VISIBLE SPECTRAL RANGE DURING AURORAL EVENTS
P. B. Seidl, G. Stasek, C. Wita, and G. Schmidtke (Fraunhofer-Inst. fuer Physikalische Messtechnik) *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 77-81 refs (For primary document see N83-33397 21-46)
(Contract BMFT-01-OE-087-ZK/WFWRK-275/2)
Avail: NTIS HC A21/MF A01

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N83-32842*# Hughes Research Labs., Malibu, Calif.
EVALUATION OF THE USE OF ON-BOARD SPACECRAFT ENERGY STORAGE FOR ELECTRIC PROPULSION MISSIONS
R. L. Poeschel and F. M. Palmer Aug. 1983 42 p
(Contract NAS3-23258)
(NASA-CR-168209; NAS 1.26:168209) Avail: NTIS HC A03/MF A01 CSCL 21C

On-board spacecraft energy storage represents an under utilized resource for some types of missions that also benefit from using relatively high specific impulse capability of electric propulsion. This resource can provide an appreciable fraction of the power required for operating the electric propulsion subsystem in some missions. The most probable mission requirement for utilization of this energy is that of geostationary satellites which have secondary batteries for operating at high power levels during eclipse. The study summarized in this report selected four examples of missions that could benefit from use of electric propulsion and on-board energy storage. Engineering analyses were performed to evaluate the mass saved and economic benefit expected when electric propulsion and on-board batteries perform some propulsion maneuvers that would conventionally be provided by chemical propulsion. For a given payload mass in geosynchronous orbit, use of electric propulsion in this manner typically provides a 10% reduction in spacecraft mass. Author

N83-32843*# Colorado State Univ., Fort Collins. Dept. of Mechanical Engineering.
ELECTRIC THRUSTER RESEARCH
Harold R. Kaufman and Raymond S. Robinson Dec. 1982 134 p refs
(Grant NsG-3011)
(NASA-CR-168134; NAS 1.26:168134) Avail: NTIS HC A07/MF A01 CSCL 21C

It has been customary to assume that ions flow nearly equally in all directions from the ion production region within an electron-bombardment discharge chamber. In general, the electron current through a magnetic field can alter the electron density, and hence the ion density, in such a way that ions tend to be directed away from the region bounded by the magnetic field. When this mechanism is understood, it becomes evident that many past discharge chamber designs have operated with a preferentially directed flow of ions. Thermal losses were calculated for an oxide-free hollow cathode. At low electron emissions, the total of the radiation and conduction losses agreed with the total discharge power. At higher emissions, though, the plasma collisions external to the cathode constituted an increasingly greater fraction of the discharge power. Experimental performance of a Hall-current thruster was adversely affected by nonuniformities in the magnetic field, produced by the cathode heating current. The technology of closed-drift thrusters was reviewed. The experimental electron diffusion in the acceleration channel was found to be within about a factor of 3 of the Bohm value for the better thruster designs at

most operating conditions. Thruster efficiencies of about 0.5 appear practical for the 1000 to 2000 s range of specific impulse. Lifetime information is limited, but values of several thousands of hours should be possible with anode layer thrusters operated < or = to 2000 s. Author

N83-32820# Air Force Systems Command, Wright-Patterson AFB, Ohio.
LIMIT ANALYSIS OF THE STRUCTURAL STRENGTH FOR THE COMBUSTION CHAMBER OF A LIQUID ROCKET ENGINE
In its J. of Chinese Society of Astronautics (selected articles) (FTD-ID(RS)T-0084-83) 10 Mar. 1983 p 18-47 refs Transl. into ENGLISH from Yuhang Xuebao (China), no. 3, 1982 30 p (For primary document see N83-32818 21-12)
Avail: NTIS HC A04/MF A01 CSCL 22/1

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

No abstracts in this category.

24 COMPOSITE MATERIALS

Includes laminates.

N83-32844 Clemson Univ., S.C.
EXPERIMENTAL DETERMINATION OF INTERNAL DAMAGE GROWTH IN UNIDIRECTIONAL BORON/ALUMINUM COMPOSITE LAMINATES Ph.D. Thesis
Walter Fleming Jones 1982 109 p
Avail: Univ. Microfilms Order No. DA8300104

An experimental investigation dealing with the fracture behavior of unidirectional boron/aluminum composite laminates is conducted in order to verify the results of mathematical models developed by the author and associates. These models predict the stresses and displacements of fibers and the amount of damage growth in a center-notched lamina as a function of the applied remote stress and the matrix and fiber material properties. The damage may take the form of longitudinal yielding and splitting in the matrix as well as stable transverse damage consisting of broken fibers and matrix yielding ahead of the notch. A brittle lacquer coating is used to detect the yielding in the matrix while X ray techniques are used to determine the number of broken fibers in the laminate. The notched strengths and the amounts of damage found in the experimental specimens agree well with those predicted by the mathematical model. Dissert. Abstr.

N83-32845 Societe Nationale Industrielle Aerospatiale, Les Mureaux (France).
A METHOD FOR CALCULATING LOCAL EFFECTS [SUR UNE METHODE DE CALCUL DES EFFETS LOCAUX]
C. Auriel, G. Boubal, and P. Ladeveze (Ecole Normale Superieure de l'Enseignement Technique) 1982 12 p refs In FRENCH Presented at AMAC Conf. Troisiemes Journees Nationales sur les Composites, Paris, 21-23 Sep. 1982
(SNIAS-831-422-115) Avail: NTIS HC A02

A numerical method for calculating local effects on composite materials represented by an equivalent homogeneous material is presented. The effects are obtained as corrections to local stresses associated with the homogenized calculation. The constituants are assumed to be distributed periodically. Behavior is elastic or linearized around a stress level. The method is compared to a numerical simulation which takes into account the local characteristics of constituents, for a tensile test specimen. Results show that the method is accurate, especially in areas where the cross section of the test specimen changes. Author (ESA)

N83-32846*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SUPERPOSITION METHOD FOR ANALYSIS OF FREE-EDGE STRESSES
John D. Whitcomb and I. S. Raju Jun. 1983 33 p refs
(NASA-TM-85657; NAS 1.15:85657) Avail: NTIS HC A03/MF A01 CSCL 11D

Superposition techniques were used to transform the edge stress problem for composite laminates into a more lucid form. By eliminating loads and stresses not contributing to interlaminar stresses, the essential aspects of the edge stress problem are easily recognized. Transformed problem statements were developed for both mechanical and thermal loads. Also, a technique for approximate analysis using a two dimensional plane strain analysis was developed. Conventional quasi-three dimensional analysis was used to evaluate the accuracy of the transformed problems and the approximate two dimensional analysis. The transformed problems were shown to be exactly equivalent to the original problems. The approximate two dimensional analysis was found to predict the interlaminar normal and shear stresses reasonably well. Author

N83-32847# California Univ., Livermore. Lawrence Livermore Lab.
STATISTICS FOR THE TIME-DEPENDENT FAILURE OF KEVLAR-49/EPOXY COMPOSITES: MICROMECHANICAL MODELING AND DATA INTERPRETATION
S. L. Phoenix (Cornell Univ.) and E. M. Wu Mar. 1983 25 p refs
(Contract W-7405-eng-48)
(DE83-011087; UCRL-53365) Avail: NTIS HC A02/MF A01

Some new data on the strength and stress-rupture of Kevlar-49 fibers, fiber/epoxy strands and pressure vessels, and consolidated data obtained over the past 10 years is given. This data was interpreted by using recent theoretical results from a micromechanical model of the statistical failure process, thereby gaining understanding of the roles of the epoxy matrix and ultraviolet radiation on long term lifetime. DOE

N83-32848# Oak Ridge National Lab., Tenn.
RECENT DEVELOPMENTS IN GRAPHITE
J. E. Cunningham 1983 4 p Presented at the Am. Soc. for Metals Meeting, Cleveland, 16 Mar. 1983
(Contract W-7405-eng-26)
(DE83-009783; CONF-830336-1) Avail: NTIS HC A02/MF A01

The high temperature gas cooled reactor (HTGR) graphite situation which is in excellent shape is discussed. In both of the critical requirements, fuel blocks and support structures, adequate graphites are at hand and improved grades are sufficiently far along in truncation. In the aerospace field, GraphNOL N3M permits vehicle performance with confidence in trajectories unobtainable with any other existing material. For fusion energy applications, no other graphite can simultaneously withstand both extreme thermal shock and neutron damage. The material promises to create new markets and to offer a better candidate material for existing applications. DOE

N83-32849# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France).
MOLDS OF THERMOSTABLE CARBON-RESIN FIBER COMPOSITES [MOULAGES DES COMPOSITES FIBRES DE CARBONE-RESINES THERMOSTABLES]
P. Hebrard 1982 25 p In FRENCH Presented at Colloq. Polymers Organiques pour Temp. Eleves, Rueil-Malmaison, France, Nov. 1982
(SNIAS-831-422-104) Avail: NTIS HC A02/MF A01

Thermal analysis of PMR 15 and LaRC 160 polyamides and polystyryl pyridine was carried out to test their suitability for ballistic missiles. Exothermicity of the resin during polymerization was measured by differential microcalorimetry. Prepreg mass loss

was studied as a function of time and temperature by thermogravimetry. The best moment for applying pressure was determined by dynamic viscoelastic analysis. Results indicate that the thermal properties of these materials are far superior to those of epoxy resin composites, but polymerization cycles are more difficult.
Author (ESA)

N83-32850# Societe Nationale Industrielle Aerospatiale, Suresnes (France). Lab. Central.
INFLUENCE OF PRODUCTION DEFECTS ON THE STATIC AND DYNAMIC BEHAVIOR OF CARBON RESIN COMPOSITES [INFLUENCE DE DEFAUTS DE FABRICATION SUR LE COMPORTEMENT STATIQUE ET DYNAMIQUE DES STRUCTURES EN COMPOSITES CARBONE-RESINE]
J. Cuny and G. Briens 25 May 1983 10 p In FRENCH Presented at AGARD Congr., London, 12-14 Apr. 1983
(SNIAS-831-551-104; C.45.023/83) Avail: NTIS HC A02/MF A01

Porosity, lack of interstrata cohesion, inclusion of foreign bodies, and bonding defects arising during the production of composite materials are discussed. Nondestructive methods for detecting these faults are summarized. Tests on the effect of porosity on tensile strength, compression loading, shear stress and bending; on the effects of delamination; and on bonding faults are described. Results show that manufacturing faults have most influence on newly produced materials, and do not increase degradation when the material is exposed to humid environments or subjected to cyclic loads. Author (ESA)

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N83-32851 ESDU International Ltd., London (England).
THERMAL CONDUCTIVITY OF LIQUID ALDEHYDES AND KETONES
Sep. 1980 20 p refs Sponsored by Inst. of Chemical Engineers
(ESDU-80014; ISBN-0-85679-297-7; ISSN-0141-4062) Avail: ESDU

This Data Item is an addition to the Physical Data, Chemical Engineering Subseries. Vapor pressure data for 15 n-alkyl aldehydes up to C2O and 70 ketones up to C2O are given. The thermal conductivities critically evaluated and fitted by each compound are given together with tables of the thermal conductivity at 10K intervals. The values of the critical temperature are provided and where the compound may decompose these values are estimated. ESDU

N83-32852 ESDU International Ltd., London (England).
VISCOSITY OF LIQUID ALIPHATIC HYDROCARBONS: ALKENES
Sep. 1980 15 p refs Sponsored in part by Institution of Chemical Engineers
(ESDU-80015; ISBN-0-85679-298-5; ISSN-0141-4062) Copyright. Avail: ESDU

This Data Item is an addition to the Physical Data, Chemical Engineering Subseries. Dynamic viscosity data at saturation pressure for 55 alkenes, straight chain up to C2O and branched chain up to C1O are provided. The data were critically evaluated and fitted by a single equation for which the coefficients for each compound are provided. The values are tabulated at intervals of 10 K from the melting point to 0.9 of the critical temperature. Data for some compounds were estimated and this is clearly indicated. Guidance on the effect of pressure is also given. ESDU

N83-32853 ESDU International Ltd., London (England).
VAPOUR PRESSURES AND CRITICAL POINTS OF LIQUIDS. INTRODUCTION TO DATA ITEMS ISSUED AFTER JULY 1980
Aug. 1980 6 p refs Sponsored by Institution of Chemical Engineers
(ESDU-80016; ISBN-0-85679-299-3; ISSN-0141-4062) Avail: ESDU

This Data Item is an addition to the Physical Data, Chemical Engineering Subseries. The reasons for the choice of the particular form of the Wagner equation used in correlating and presenting the data on vapor pressure used in subsequent ESDU data are given. Comments and explanations are given on correlation, extrapolation, and interpolation. ESDU

N83-32854 ESDU International Ltd., London (England).
VAPOUR PRESSURES AND CRITICAL POINTS OF LIQUIDS. PART 6: ESTERS OF ALIPHATIC CARBOXYLIC ACIDS
Aug. 1980 17 p refs Sponsored by Institution of Chemical Engineers
(ESDU-80019-Pt-6; ISBN-0-85679-302-7; ISSN-0141-4062) Avail: ESDU

This Data Item is an addition to the Physical Data, Chemical Engineering Subseries. The vapor pressures of 10 formates, 14 acetates, 8 propionates, 8 butyrates and 6 isobutyrates in the temperature range from near the melting point to the critical point were evaluated and fitted by a Wagner equation. The coefficients of the equation for each compound are given together with tables of the vapor pressures at 5 K intervals. The values of T sub c and P sub c are given. Where the compound may decompose these are estimated. Additional esters are dealt with in ESDU 81003. ESDU

N83-32855 ESDU International Ltd., London (England).
VAPOUR PRESSURES AND CRITICAL POINTS OF LIQUIDS. PART 17: ALIPHATIC CARBOXYLIC ACIDS AND ANHYDRIDES
Aug. 1980 17 p Sponsored by Institution of Chemical Engineers (ESDU-80029-Pt-17; ISBN-0-85679-312-4; ISSN-0141-4062) Avail: ESDU

This Data Item is an addition to the Physical Data, Chemical Engineering Subseries. Vapor pressure data for 51 compounds are given. These include 18 alkanoic acids, 9 alkenoic acids, dioic, hydroxy and alkoxy, oxo and halogenated acids and 10 anhydrides. The vapor pressures were critically evaluated and fitted by a Wagner equation. The coefficients of the equation for each compound are given together with tables of the vapor pressures at 5K intervals. The values of T sub c and P sub c are given. Where the compound may decompose these are estimated. ESDU

N83-32856 ESDU International Ltd., London (England).
VAPOUR PRESSURES AND CRITICAL POINTS OF LIQUIDS. PART 18. ADDITIONAL ESTERS OF ALIPHATIC CARBOXYLIC ACIDS
Feb. 1981 15 p ref Sponsored in part by the Institution of Chemical Engineers
(ESDU-81003; ISBN-0-85679-325-6; ISSN-0141-4062) Avail: ESDU

This Data Item is an addition to the Physical Data, Chemical Engineering Subseries. ESDU 81003 gives vapor pressure data for 53 compounds not covered by ESDU 80019. These include 6 isovalerates, 12 esters of higher alkanoic acids (hexanoates etc), 10 acrylates and methacrylates, 5 oxalates and 10 other esters of dicarboxylic acids, and esters of hydroxy carboxylic acids, oxo carboxylic acids and halogenated carboxylic acids. The vapor pressures were critically evaluated and fitted by a Wagner equation. The coefficients of the equation for each compound are given together with tables of the vapor pressures at 5 K intervals. The values of T sub c and P sub c are given. Where the compound may decompose these are estimated. ESDU

N83-32857 ESDU International Ltd., London (England).
THERMOPHYSICAL PROPERTIES OF INDUSTRIALLY IMPORTANT FLUIDS ON THE SATURATION LINE: AMMONIA
Apr. 1981 15 p refs Sponsored by Institution of Chemical Engineers and Institution of Mechanical Engineers

(ESDU-81010; ISBN-0-85679-335-3; ISSN-0141-4062; ISSN-0141-4070) Avail: ESDU

This Data Item is an addition to the Physical Data, Chemical Engineering Subseries and to the Physical Data, Mechanical Engineering Subseries. Equations and tables for the evaluated thermophysical properties of ammonia are provided. The properties provided by equations and tables include liquid and vapor density enthalpy, isobaric heat capacity, viscosity and thermal conductivity and vapor pressure, latent heat of vaporization, liquid heat capacity at saturation and surface tension, all along the saturation line. ESDU

N83-32858 ESDU International Ltd., London (England).
THERMAL CONDUCTIVITY OF LIQUID ALIPHATIC NITRILES
Jun. 1981 10 p refs Sponsored in part by the Institution of Chemical Engineers
(ESDU-81015; ISBN-0-85679-340-X; ISBN-0141-4062) Avail: ESDU

This Data Item is an addition to the Physical Data, Chemical Engineering Subseries. Thermal conductivity data for 24 compounds are given. These include 17 alkanonitriles. The thermal conductivities were critically evaluated and fitted by a single equation. The coefficients of the equation for each compound are given together with tables of the thermal conductivity at 10K intervals. The values of critical temperature are given and where the compound may decompose these values are estimated. ESDU

N83-32859 ESDU International Ltd., London (England).
VISCOSITY OF LIQUID AROMATIC HYDROCARBONS
Sep. 1981 19 p refs Sponsored in part by the Institution of Chemical Engineers
(ESDU-81016; ISBN-0-85679-345-0; ISSN-0141-4062) Avail: ESDU

This Data Item is an addition to the Physical Data, Chemical Engineering Subseries. Dynamic viscosity data at saturation pressure for 71 aromatic hydrocarbons are given. These include benzene and its straight chain derivatives up to C26, dimethyl (XYlene) and other methyl - straight chain derivatives up to C21, and 8 other compounds such as cumene, naphthalene and biphenyl. The data were critically evaluated and fitted by a single equation for which the coefficients for each compound are provided. The values are tabulated at intervals of 10K from the melting point to 0.9 of the critical temperature. Data for some compounds were estimated and this is clearly indicated. Guidance on the effect of pressure is also given. ESDU

N83-32860 ESDU International Ltd., London (England).
VAPOUR PRESSURES AND CRITICAL POINTS OF LIQUIDS. PART 19: PHENOL AND DERIVATIVES
Aug. 1981 27 p refs Sponsored by Institution of Chemical Engineers
(ESDU-81025; ISBN-0-85679-357-4; ISSN-0141-4062) Avail: ESDU

This Data Item is an addition to the Physical Data, Chemical Engineering Subseries. Vapor pressure data for 52 aliphatic derivatives of phenol are given. These include phenol, all the cresols and xylenols. The vapor pressures were critically evaluated and fitted by a Wagner equation. The coefficients of the equation for each compound are given together with tables of the vapor pressures at 5 K intervals. The values of critical temperature and critical pressure (T sub c and P sub c) are given. Where the compound may decompose these are estimated. ESDU

N83-32861 ESDU International Ltd., London (England).
HEAT CAPACITY AND ENTHALPY OF LIQUIDS: ALIPHATIC KETONES
Sep. 1981 9 p Sponsored by Institution of Chemical Engineers
(ESDU-81030; ISBN-0-85679-363-9; ISSN-0141-4062) Avail: ESDU

This Data Item is an addition to the Physical Data, Chemical Engineering Subseries. Values of saturated liquid heat capacity and enthalpy are given in tabular form for aliphatic ketones. The data are tabulated at intervals of 10K in the range from the melting point to 0.8 of the critical temperature. The effects of pressure are indicated. Values of enthalpy have been derived from values of heat capacity. Equations for the heat capacity and enthalpy are provided with the coefficients for each compound. ESDU

N83-32862 ESDU International Ltd., London (England).
VAPOUR PRESSURES AND CRITICAL POINTS OF LIQUIDS. 20: ADDITIONAL DERIVATIVES OF PHENOL
Nov. 1982 11 p Sponsored by the Inst. of Chemical Engineers.
(ESDU-81042; ISBN-0-85679-374-4; ISSN-0141-4062) Avail: ESDU

This Data Item is an addition to the Physical Data, Chemical Engineering Subseries. Pressure data for 29 compounds not covered by ESDU 81025 are presented. These include chloro, bromo and fluoro as well as nitro, hydroxy and aromatic derivatives. The vapor pressures were critically evaluated and fitted by a Wagner equation. The coefficients of the equation for each compound are given together with tables of the vapor pressures at 5 K intervals. The values of T sub c and P sub c are given. Where the compound may decompose these are estimated. ESDU

N83-32863 ESDU International Ltd., London (England).
THERMOPHYSICAL PROPERTIES OF INDUSTRIALLY IMPORTANT FLUIDS ON THE SATURATION LINE: PHENOL
Mar. 1982 15 p Sponsored in part by the Institution of Chemical Engineers
(ESDU-82004; ISBN-0-85679-382-5; ISSN-0141-4062) Avail: ESDU

This Data Item is an addition to the Physical Data, Chemical Engineering Subseries. Equations and tables for the evaluated thermophysical properties of phenol for temperatures from the melting point to 0.98 of the critical temperature are given. The properties provided by equations and tables include liquid and vapor density, enthalpy, isobaric heat capacity, viscosity and thermal conductivity and vapor pressure, latent heat of vaporization, liquid heat capacity at saturation and surface tension, all along the saturation line. ESDU

N83-32864 ESDU International Ltd., London (England).
VAPOUR PRESSURES AND CRITICAL POINTS OF LIQUIDS. PART 21. CYCLIC HYDROCARBONS
Jun. 1982 25 p refs Sponsored in part by the Institution of Chemical Engineers
(ESDU-82016; ISBN-0-85679-390-6; ISSN-0141-4062) Avail: ESDU

This Data Item is an addition to the Physical Data, Chemical Engineering Subseries. Vapor pressure data for 64 compounds are given. These include 44 cycloalkanes, 9 cycloalkenes, and 2 other compounds such as pinene. The vapor pressures were critically evaluated and fitted by a Wagner equation. The coefficients of the equation for each compound are given together with tables of the vapor pressure at 5K intervals. The values of T sub c and P sub c are given. Where the compound may decompose these are estimated. ESDU

N83-32865 ESDU International Ltd., London (England).
FIRE HAZARD PROPERTIES: FLASH POINTS, FLAMMABILITY LIMITS AND AUTOIGNITION TEMPERATURES
Oct. 1982 25 p refs
(ESDU-82030; ISBN-0-85679-411-2; ISSN-0141-4062) Avail: ESDU

This Data Item is an addition to the Physical Data, Chemical Engineering, Physical Data, Mechanical Engineering Subseries. Explanatory notes, background information and tabular data relating to flash points are provided. Flammability limits and ignition temperatures of combustible and flammable substances are given. Data on these properties are given in tables for selected groups of compounds. Fire hazards are represented by values for flash point, fire point and flammability limits with autoignition temperatures having a relevance where elevated temperatures are involved. Reported experimental and estimated values of closed cup flash point, flammability limits and autoignition temperatures are presented in tables. These flammability properties are dependent on the

purity of the substances and on the method of determination used. ESDU

N83-32866 ESDU International Ltd., London.(England).
THERMOPHYSICAL PROPERTIES OF INDUSTRIALLY IMPORTANT FLUIDS ON THE SATURATION OF LINE: CRESOLS
Oct. 1982 19 p refs
(ESDU-82032; ISBN-0-85679-412-0; ISSN-0141-4062) Avail: ESDU

This Data Item is an addition to the Physical Data, Chemical Engineering Subseries. Equations and tables for the evaluated thermophysical properties of otho, meta and para cresol for temperatures from the melting point to 0.98 of the critical are given. The properties provided by equations and tables include liquid and vapor density, enthalpy, isobaric heat capacity, viscosity and thermal conductivity and vapor pressure, latent heat of vaporization, liquid heat capacity at saturation and surface tension, all along the saturation line. ESDU

N83-32867 ESDU International Ltd., London (England).
THERMOPHSICAL PROPERTIES OF INDUSTRIALLY IMPORTANT FLUIDS ON THE SATURATION LINE: XYLENOLS
Apr. 1983 19 p refs
(ESDU-83005; ISBN-0-85679-425-2; ISSN-0141-4062) Avail: ESDU

This Data Item is an addition to the Physical Data, Chemical Engineering Subseries and to Physical Data, Mechanical Subseries. Equations and tables for the evaluated thermophysical properties of all six xylenols for temperatures from the melting point to 0.98 of the critical are provided. The properties provided by equations and tables include liquid and vapor density, enthalpy, isobaric heat capacity, viscosity and thermal conductivity and vapor pressure, latent heat of vaporization, liquid heat capacity at saturation and surface tension, all along the saturation line. ESDU

N83-32868*# California Univ., Los Angeles. Dept. of Chemical Engineering.
BIOLOGICAL PARTICLE ANALYSIS BY MASS SPECTROMETRY Final Report, 21 Oct. 1981 - 20 Oct. 1982
Vincent L. Vilker and Robert M. Platz Mar. 1983 7 p
(Contract JPL-956144)
(NASA-CR-172967; NAS 1.26:172967) Avail: NTIS HC A02/MF A01 CSCL 07D

An instrument that analyzes the chemical composition of biological particles in aerosol or hydrosol form was developed. Efforts were directed toward the acquisition of mass spectra from aerosols of biomolecules and bacteria. The filament ion source was installed on the particle analysis by mass spectrometry system. Modifications of the vacuum system improved the sensitivity of the mass spectrometer. After the modifications were incorporated, detailed mass spectra of simple compounds from the three major classes of biomolecules, proteins, nucleic acids, and carbohydrates were obtained. A method of generating bacterial aerosols was developed. The aerosols generated were collected and examined in the scanning electron microscope to insure that the bacteria delivered to the mass spectrometer were intact and free from debris. S.L.

N83-32869# National Bureau of Standards, Washington, D.C.
RADIATIVE IGNITION AND OPPOSED FLOW FLAME SPREAD MEASUREMENTS ON MATERIALS Final Report, Mar. 1981 - Sep. 1982
Margaret Harkleroad, James Quintiere, and William Walton Atlantic City FAA Aug. 1983 92 p refs
(FAA Proj. 181-350-100)
(FAA-CT-83-28) Avail: NTIS HC A05/MF A01

A fire-testing method that relates material ignitability and flame spread in the creeping mode was tested. The analytical approach involves parameters and solutions arising from transient heat condition to a semi-infinite solid. Experimental data are generated on an apparatus employing a radiant panel to provide a varying heat flux to test specimens. Flame-spread rates and ignition events are measured against incident radiation and exposure time. The flame-spread data for given materials are correlated for varying exposure conditions by plotting the inverse square root of the flame-spread velocity against a product of the heat flux and a time function. The test and analysis results are shown for six diverse materials representative of aircraft (interior panels, carpeting, and seat cushions) and buildings (plywood, polymethyl methacrylate, and foam). S.L.

N83-32870*# Spring Arbor Coll., Mich. Dept. of Chemistry.
ANALYSIS OF THE VISIBLE SPECTRA OF CONCENTRATED CHROMIC CHLORIDE SOLUTIONS Thesis. Final Report
William D. Bunch May 1983 37 p refs
(Grant NAG3-148)
(NASA-CR-172998; NAS 1.26:172998) Avail: NTIS HC A03/MF A01 CSCL 07D

In the development of the Redox Energy Storage System, the electrical storage efficiency is low due to the complex chemical reaction of the chromium II and III species. Several studies dealing with the processes occurring at the catalyzed carbon electrode during the charging and discharging of the system are described. S.L.

N83-32871*# Spring Arbor Coll., Mich.
THE CHEMICAL BEHAVIOR OF ACIDIFIED CHROMIUM (3) SOLUTIONS B.S. Thesis
Darlene K. Terman May 1981 29 p refs
(Grant NAG3-148)
(NASA-CR-172997; NAS 1.26:172997) Avail: NTIS HC A03/MF A01 CSCL 07D

A unique energy-storage system has been developed at NASA's Lewis Research Center called REDOX. This NASA-REDOX system is an electrochemical storage device that utilized the oxidation and reduction of two fully soluble redox couples for charging and discharging. The redox couples now being investigated are acidified chloride solutions of chromium (Cr(+2)/Cr(+3)) and iron (Fe(+2)/Fe(+3)). B.W.

N83-32872*# Spring Arbor Coll., Mich.
SPECTROPHOTOMETRIC ANALYSIS OF AQUEOUS MIXTURES OF SOME CHROMIUM (III) COMPLEXES Thesis
Gregory Stevens May 1983 27 p refs
(Grant NAG3-148)
(NASA-CR-172999; NAS 1.26:172999) Avail: NTIS HC A03/MF A01 CSCL 07D

Several methods of determining the relative concentrations of Cr(H2O)5C1(+2) and Cr(H2O)6(+3) are described. The three methods studied are curved resolving methods, used in evaluating spectrophotometric results, mixture results, used in verifying curve resolving techniques, and chromium analysis. S.L.

N83-32873# Aerospace Corp., El Segundo, Calif. Chemistry and Physics Lab.
CHEMICAL STABILITY OF BARIUM CALCIUM ALUMINATE DISPENSER CATHODE IMPREGNANTS
R. A. Lipeles and H. K. A. Kan 1 Aug. 1982 37 p refs
(ATR-82(8424)-1) Avail: NTIS HC A03/MF A01

A thermodynamic model was formulated to describe the effects of temperature and composition on the chemistry of barium and barium oxide (Ba/BaO) generation from dispenser cathode impregnants. Our approach is to make use of the BaO-CaO-Al2O3 phase diagram and BaO vapor pressures of impregnant phases to calculate the BaO vapor pressure of the impregnant. The Ba/BaO vapor pressures are used to calculate Ba/BaO generation and evaporation rates from a wide range of impregnant compositions. Two trends are evident. First, increasing the Ba concentration in the impregnant generally forms high vapor pressure Ba-rich phases leading to high Ba/BaO evaporation rates. Second, increasing Ca concentration in the impregnant lowers the Ba/BaO vapor pressures by forming more stable barium-calcium-aluminate solid solutions. This model illustrates the possibility of extending cathode life by selecting impregnants composed of fairly stable solid-solution phases for use in cathodes that must be operated at high temperature for high current density. Author

N83-32874# Argonne National Lab., Ill. Chemical Technology Div.
EXPLORATORY AND BASIC FLUIDIZED-BED COMBUSTION STUDIES Annual Report, Oct. 1980 - Sep. 1981
Irving Johnson, K. M. Myles, D. C. Fee, D. C. Moulton, J. A. Shearer, G. W. Smith, C. B. Turner, and W. I. Wilson Dec. 1982 80 p refs
(Contract W-31-109-eng-38)
(DE83-008725; ANL/FE-82-4) Avail: NTIS HC A05/MF A01

Development work was done in support of atmospheric and pressurized fluidized bed combustion. Sulfur retentions obtained in fluidized bed combustors were compared with results obtained by thermogravimetric analysis to identify the reasons for discrepancies in results from the two sulfation devices. In other work, basic studies and engineering studies were performed on the process for enhancing limestone sulfation by hydrating partially sulfated stone. Other laboratory studies were carried out to determine the effect of attrition on the particle size distribution of sorbents in a pneumatic transport system and why some stones exhibit popping (explosive disintegration) when subjected to shock calcination and some do not. DOE

N83-32875# Pacific Northwest Lab., Richland, Wash.
SUPERCRITICAL FLUID CHROMATOGRAPHY: MASS SPECTROMETRY
R. D. Smith, J. Fjeldsted (Brigham Young Univ., Provo, Utah), and M. L. Lee (Brigham Young Univ., Provo, Utah) Aug. 1982 5 p refs Presented at the 9th Intern. Mass Spectrometry Conf., Vienna, 29 Aug. - 3 Sep. 1982
(Contract DE-AC06-76RL-01830)
(DE83-001951; PNL-SA-10074; CONF-830883-1) Avail: NTIS HC A02/MF A01

An interface for capillary column supercritical fluid chromatography-mass spectrometry (SFC-MS) is described and initial results are presented. The advantages of SFC include the ability to separate high molcular weight, nonvolatile, and thermally unstable compounds not amenable to GC. A capillary column SFC-MS interface can replace HPLC-MS in most applications and has advantages due to the higher possible chromatographic efficiency, mobile phase volatility, and the simplicity of the interface design. Pressure programming during the chromatographic separation also allows precise control over the solvating power of the supercritical fluid mobile phase. The direct fluid injection interface provides for transfer of the total SFC effluent into a chemical ionization source. Results are presented to illustrate the separation analysis of mixtures of aromatic hydrocarbons and styrene oligomers using n-pentane and carbon dioxide as the mobile phase. DOE

N83-32876# California Univ., Livermore. Lawrence Livermore Lab.
HIGH-PRESSURE PYROLYSIS OF COLORADO OIL SHALE
A. K. Burnham and M. F. Singleton Oct. 1982 22 p refs Presented at Am. Chem. Soc. Meeting, Seattle, 20 Mar. 1982 Revised
(Contract W-7405-eng-48)
(DE83-001496; UCRL-88127-Rev-1; CONF-820399-1-Rev-1) Avail: NTIS HC A02/MF A01

Rates of oil evolution and oil yields and compositions are reported for heating rates from 1 to 100 C/min and pressures up to 27 atm. Pyrolysis occurs in an autogenous atmosphere and generated products are allowed to escape the pyrolysis region continuously. Both higher pressures and lower heating rates cause a decrease in oil yield, although the effects are not additive. The lowest oil yield was approximately 72 wt% or 79 vol% of Fischer assay. Lower oil yield is generally accompanied by lower nitrogen content and density and higher H/C ratios. The high pressure/slow heating rate oils are a clear amber color instead of the usual opaque brown. The effect of pyrolysis conditions on biological markers and other diagnostic hydrocarbons was demonstrated. DOE

N83-32877# Argonne National Lab., Ill. Chemical Engineering Div.
DISCHARGE AND HANDLING OF SOLIDS FROM PRESSURIZED FLUIDIZED-BED COMBUSTORS
John E. Hanway and W. F. Podolski Oct. 1982 63 p refs
(Contract W-31-109-eng-38)
(DE83-005941; ANL/CEN/FE-81-3) Avail: NTIS HC A04/MF A01

The discharge and handling of spent solids from pressurized fluidized bed combustors (PFBCs) are important functional aspects of operating units. If PFBC technology is to be readily accepted commercially, simple, functional, and reliable methods fo the discharge and handling of solids from pressurized vessels must be available. The status of solids discharge and handling in pressurized fluidized bed systems is assessed. It traces the historical evolution of solids discharge and handling methods, relates these developments to present usage, evaluates the commercial suitability of current and proposed methods, and outlines the effort believed necessary to develop commercially acceptable systems. DOE

N83-32878# State Univ. of New York, Stony Brook. Dept. of Materials Science and Engineering.
THERMOLUMINESCENCE OF THE MINERAL COMPONENTS IN GRANITE
R. G. Schwartzman, J. A. Kierstead (BNL), and P. W. Levy (BNL) 1982 21 p refs Presented at the 3rd Intern. Seminar on Thermoluminescence and ESR Dating, Elsinore, Denmark, 1 Jul. 1982
(Contract DE-AC02-76CH-00016)
(DE83-003929; BNL-32210; CONF-820764-1) Avail: NTIS HC A02/MF A01

The thermoluminescence (TL) of the minerals in Climax Stock (Nevada, USA) granite was studied. The principal mineral constituents are plagioclase, quartz, potassium feldspar and biotite. Pyrite, sphene apatite and zircon occur at one percent or less. All exhibit TL except biotite. The TL kinetics were determined for plagioclase, quartz, potassium feldspar and pyrite. Plagioclase and potassium feldspar exhibit second order and pyrite first order kinetics. Natural TL of quartz follows second order and artificial TL first order kinetics. However, in these four minerals unrealistic kinetic parameters are often obtained; thus more general kinetics, e.g. interactive kinetics, may aply. Author (GRA)

N83-32879# Oak Ridge National Lab., Tenn.
EXAMINATION OF SHORT-CONTACT-TIME COAL LIQUEFACTION PRODUCT STABILITY
R. M. Wham, B. R. Rodgers, and G. C. Frazier 1982 24 p refs Presented at Ann. Meeting of Heat Transfer and Energy Conversion, Los Angeles, 14 Nov. 1982
(Contract W-7405-eng-26)
(DE83-003415; CONF-821106-17-Draft) Avail: NTIS HC A02/MF A01

An experimental apparatus for producing short contact time (SCT) coal liquefaction material was assembled to replace tubing bomb microreactors. The apparatus consists of a 300 cubic autoclave, coal delivery equipment, temperature monitoring and control equipment, and gas traps for venting gaseous reaction products. Additionally, methods for evaluation of short contact time liquefaction products were reviewed and evaluated for applicability to this project. The results of elemental analysis; time-temperature profiles; fractionation into oils, asphaltenes, preasphaltenes, and residue; and high performance liquid chromatography are discussed. The applicability of the analysis methods to developing correlations relating short contact time liquefaction products to process conditions is also discussed. Finally, preliminary data from 19 cubic tubing bomb microreactors are discussed. Differences in operation of the 300 cm autoclave and the 19 microreactors are compared. DOE

N83-32880# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.
HIGH-PRESSURE VAPOR-LIQUID EQUILIBRIA IN A TERNARY SYSTEMS CONTAINING TWO MISCIBLE LIQUIDS AND ONE SUPERCRITICAL GAS
R. J. Topliss, D. Dimitrelis, and J. M. Prausnitz Sep. 1982 24 p

refs Presented at Royal Soc. of Chem. Meeting on Indus. Phys. Chem., Cambridge, England, 13 Sep. 1982
(Contract DE-AC03-76SF-00098)
(DE83-002631; LBL-15065; CONF-820987-1) Avail: NTIS HC A02/MF A01

For process design in supercritical fluid extraction, it is desirable to use a molecular-thermodynamic model to calculate phase equilibria as a function of temperature, pressure and composition. A recently developed equation of state, applicable to mixtures of polar and nonpolar fluids, provides the desired model. The equation of state, using one pure-component and binary parameters, holds for gas-like and liquid-like densities; its extension to mixtures is based on the local-composition concept. A reliable and efficient computer program has been developed for calculating vapor-liquid, liquid-liquid or vapor-liquid-liquid equilibria in multicomponent systems using the equation of state. To illustrate, calculations are presented for the ternary system water-ethanol-carbon dioxide at temperatures and pressures slightly higher or lower than carbon dioxide's critical. Calculated distribution coefficients are sensitive to the choice of equation-of-state parameters. DOE

N83-32881# Los Alamos Scientific Lab., N. Mex.
ACCELERATOR-BASED MASS SPECTROMETRY OF HEAVY METHANE
J. R. Tesmer, M. M. Fowler, and J. B. Wilhelmy 1982 9 p refs Presented at the Symp. for North Eastern Accelerator Personnel, Seattle, 6 Oct. 1982
(Contract W-7405-eng-36)
(DE83-000601; LA-UR-82-2828; CONF-821066-1) Avail: NTIS HC A02/MF A01

A number of problems in the accelerator-based spectrometry of mass-21 methane are being studied. If the technique results in improved sensitivity over that of conventional spectrometry then smaller amounts of mass-21 methane can be used in the atmospheric motion studies. This would prevent a large build up of the tracer in the atmosphere which would destroy its usefulness. DOE

N83-32882# Oak Ridge National Lab., Tenn. Chemical Technology Div.
ROTATING ANNULAR CHROMATOGRAPH FOR CONTINUOUS SEPARATIONS
John M. Begovich and Warren G. Sisson 1982 30 p refs Presented at the Ann. Meeting of Heat Transfer and Energy Conversion, Los Angeles, 14-19 Nov. 1982
(Contract W-7405-eng-26)
(DE83-003441; CONF-821106-16) Avail: NTIS HC A03/MF A01

Preparative, multicomponent liquid chromatographic separations were achieved by using a slowly rotating annular sorbent bed with fixed multiple feed points and fixed product withdrawal locations. The cation exchange separation of copper, nickel, and two cobalt complexes was extensively used to study the effects of rotation rate, eluent rate, bed loading, and column size on separation performance. Experimental results were compared with three theoretical models: plate theory, an analytical solution which incorporates multicomponent Langmuir isotherms, and an extension of the analytical solution to include dispersion effects. DOE

N83-32883# Illinois Univ., Urbana. Dept. of Physics.
ELECTRON-ENERGY-LOSS SPECTROSCOPY OF TRANSITION-METAL CARBIDES Ph.D. Thesis
Craig Allison 1983 119 p refs
(Contract DE-AC02-76ER-01198)
(DE83-004151; DOE/ER-01198/1393) Avail: NTIS HC A06/MF A01

Electron energy loss spectroscopy (EELS) was applied to several problems dealing with the transition metal carbides. First, narrow (20 A) precipitates of TiC were identified in a single crystal of titanium diboride. Second, the carbon concentration in individual stacking faults of TaC was determined to be less than in the surrounding matrix, and the implications of this finding for crystal structure and mechanical properties were discussed. Next, thin films of amorphous carbon and TiO were studied with EELS. Experimental cross sections for C and Ti were obtained from these spectra and used for quantitative analysis of a material of known stoichiometry, V6C5 (by assuming V and Ti cross sections equal), and one of unknown stoichiometry, a cemented carbide composed of 1 to 5 microns grains of TiC/sub x/ embedded in a Ni-Mo binder. These experimental cross sections gave a C/V ratio of 0.84, very close to the expected value of 0.833, and a C/Ti ratio of 0.81 for a grain of TiC/sub x/, a reasonable value of x in these materials. DOE

N83-32884# Oak Ridge National Lab., Tenn. Environmental Sciences Div.
TECHNETIUM BEHAVIOR IN SULFIDE AND FERROUS IRON SOLUTIONS
Suk Y. Lee and Ernest A. Bondietti 1982 11 p refs Presented at the 6th Intern. Symp. on the Sci. Basis for Radioactive Waste Management, Boston, 1 Nov. 1982
(Contract W-7405-eng-26)
(DE83-003418; CONF-821107-32) Avail: NTIS HC A02/MF A01

Pertechmetate oxyanion, a potentially mobile species in leachate from a breached radioactive waste repository, was removed from a brine solution by precipitation with sulfide, iron, and ferrous sulfide at environmental pH's. Maghemite and geothite were the dominant minerals in the precipitate obtained from the TcO4(-) ferrous iron reaction. The observation of small particle size and poor crystallinity of the minerals formed in the presence of Tc suggested that the Tc was incorporated into the mineral structure after reduction to a lower valence state. Amorphous ferrous sulfide, an initial phase precipitating in the TcO4(-) ferrous iron sulfide reaction, was transformed to geothite and hematite on aging. The results suggested that ferrous and/or sulfide bearing groundwaters and minerals in host rocks or backfill barriers could reduce the mobility of Tc through the formation of less soluble Tc bearing iron and/or sulfide minerals. DOE

N83-32885# Bendix Corp., Kansas City, Mo.
ANALYSIS OF CONTAMINANTS ON ELECTRONIC COMPONENTS BY REFLECTANCE FTIR SPECTROSCOPY
Greg W. Griffith Sep. 1982 18 p Presented at the 7th Ann. Contamination Control Seminar, Sunnyvale, Calif., 19-21 Oct. 1982
(Contract DE-AC04-76DP-00613)
(DE83-001521; BDX-613-2845; CONF-821069-1) Avail: NTIS HC A02/MF A01

A modified reflection beam condensor which adapted to a Nicolet 7199 Fourier Transform Infrared Spectrometer is discussed. The sample beam is directed onto the sample surface and reflected from the substrate back to detector. A micropositioning XYZ stage and a close-focusing telescope are used to position the contaminant directly under the infrared beam. It is possible to analyze contaminants on 1 mm wide leads surrounded by an epoxy matrix using this device. Typical spectra of contaminants found on small circuit boards are included. DOE

N83-32886# Oak Ridge National Lab., Tenn. Operations Div.
CONCURRENT REDUCTION AND DISTILLATION: AN IMPROVED TECHNIQUE FOR THE RECOVERY AND CHEMICAL REFINEMENT OF THE ISOTOPES OF CADIUM AND ZINC
H. H. Caudill, L. E. McBride, and E. W. McDaniel 1982 16 p refs Presented at the 11th World Conf. of the Intern. Nucl. Target Dev. Soc., Seattle, Wash., 6-8 Oct. 1982
(Contract W-7405-eng-26)
(DE83-001931; CONF-821046-2) Avail: NTIS HC A02/MF A01

The Electromagnetic Isotope Separations Program of the Oak Ridge National Laboratory has been involved in the separation, chemical recovery, and refinement of the stable isotopes of cadmium and zinc since 1946. Traditionally, the chemical refinement procedures for these elements consisted of ion exchange separations using anion exchange resins followed by pH-controlled hydrogen sulfide precipitations. The procedures were quite time-consuming and made it difficult to remove trace quantities of sulfur which interferes in subsequent attempts to prepare rolled metal foils. As demands for Cd(11) and Zn(68) (a precursor for the production of the radiopharmaceutical Ga(67)) increased, it

became evident that a quicker, more efficient refinement procedure was needed. Details of an improved method, which employs concurrent hydrogen reduction and distillation in the recovery and refinement of isotopically enriched zinc, are described. Modifications of the procedure suitable for the refinement of cadmium isotopes are also described. 3 figures, 1 table. DOE

N83-32887# Brookhaven National Lab., Upton, N. Y. Process Sciences Div.
FLASH METHANOLYSIS OF WOOD FOR THE PRODUCTION OF FUELS AND CHEMICALS
Meyer Steinberg, Peter T. Fallon, and Muthu S. Sundaram 1983 26 p refs Presented at the Energy from Biomass and Wastes Symp., Lake Buena Vista, Fla., 24 Jan. 1983
(Contract DE-AC02-76CH-00016)
(DE83-006218; BNL-32400; CONF-830114-4) Avail: NTIS HC A03/MF A01

Biomass in the form of less than 1000 micron oven dried fir wood particles was flash pyrolyzed in the presence of methane (methanolysis) in a downflow 1 in. I.D. tubular reactor at pressures of 20 to 200 psi and temperatures between 800 and 1050 C. The major products were benzene, toluene and xylene (BTX), a heavy oily liquid, ethylene and carbon monoxide. As much as 12% of the available carbon in the wood was converted to BTX, 21% to the ethylene and 48% to carbon monoxide at 50 psi and 1000 C. The maximum heavier oil yield of 11% was observed at 50 psi and 800 C. Wood particle residence times for all experiments were calculated to be less than 1 second at 20 and 50 psi and up to 2.8 sec at 200 psi. The yields were found to be greatly influenced by the methane to wood feed ratio. Experiments were conducted to insure the results to be that produced from the wood and methane and not a catalytic effect of the reactor wall of foreign matter. DOE

N83-32888# Oak Ridge National Lab., Tenn.
VALENCE EFFECTS ON ADSORPTION: A PRELIMINARY ASSESSMENT OF THE EFFECTS ON VALENCE STATE CONTROL ON SORPTION MEASUREMENTS
R. E. Meyer, W. D. Arnold, F. Case, S. Y. Shiao, and D. A. Palmer Jan. 1983 28 p refs
(Contract W-7405-eng-26)
(DE83-005230; NUREG/CR-2863; ORNL-5905) Avail: NTIS HC A03/MF A01

Electrochemical arguments are advanced to illustrate that what is usually measured in practice is a mixed potential determined by the kinetics of the electrode processes occurring at the indicator electrode. Valence states can be altered electrochemically or by use of added chemical reagents, including redox couples which can hold the potential to relatively specific potentials. The disadvantage of added chemical reagents is that they may alter the characteristics of the sorption reactions by interaction with the sorbent. Electrochemical methods are versatile and do not add reagents, but in some caes the nuclide can adsorb on the electrode itself. A description is given of the application of the electrochemical method of valence control to determination of sorption of Np(V) on alumina. Valence state control and analysis can be used to study possible redox reactions on materials which might be used as backfill materials. A description is given of survey experiments with a number of sulfides and iron-containing materials. DOE

N83-32889# Sandia Labs., Livermore, Calif. Combustion Sciences Directorate.
TEMPERATURE AND REACTION RATE OF BURNING PULVERIZED FUELS
Reginald E. Mitchell and William J. McLean Nov. 1982 29 p refs Presented at the 19th Intern. Symp. on Combustion, Haifa, Israel, 8-13 Aug. 1982
(Contract DE-AC04-76DP-00789)
(DE83-004128; SAND-82-8657; CONF-820801-14) Avail: NTIS HC A03/MF A01

A two-color pyrometer technique has been used to measure the temperature of burning pulverized fuel particles flowing in dilute suspension on the centerline of a laminar flow reactor. The transparent reactor is fed by a premixed flat flame fueled with CH4-H2O2-N2 mixtures, which permit widely variable post-flame temperatures and oxygen concentrations to be obtained. Planck's law and the gray body assumption (verified here by measurements) are used to compute particle temperatures, and the average temperature is then determined by averaging the values for some 500 individual particles. Particle temperatures have been determined for various gas temperatures over a range of oxygen mole fractions from 0 to 0.2 for size-graded (90 micron mean diameter) samples of a petroleum coke and a flash pyrolysis char. Particle burning rates per unit external surface area were determined from the measured temperatures by a heat balance analysis. DOE

N83-32890# Ames Lab., Iowa. Dept. of Chemistry.
KINETICS AND MECHANISM OF METHANOL DECOMPOSITION OVER ZINC OXIDE Ph.D. Thesis
Khalid Moh'd Tawarah Jul. 1982 111 p refs
(Contract W-7405-eng-82)
(DE83-004973; IS-T-1011) Avail: NTIS HC A06/MF A01

The kinetics of CH3OH decomposition over ZnO was studied in the temperature ranges: 453 to 513 K, and 563 to 613 K. In the first range, CH3OH decomposed to H2 and CH2O, while concurrent decomposition of CH3OH and CH2O to H2, CO, and CO2 occurred in the second range. Production of CO2 was believed to be a side reaction resulting from the decomposition of a formate species. The effect of P(CH3OH) on the initial rate of production of H2, R(H2), and (CO + CO2), R/sub c/, is given by the equation: [P/sub m//R/sub i/]/sup 1/2/ = a + bP/sub/m/. No inhibition was observed for H2, CO, or CO2. At 500 K, CH3OH decomposed about 10 times faster than CH2O. Comparison of the initial rates of decomposition of CH3OH, CH3OD, and CD3OD in the low and high temperature ranges indicated that R/sub i/(CH3OH) = i/(CH3OD) >R/sub i/(CD3OD). DOE

N83-32891# California Univ., Berkeley. Lawrence Berkeley Lab. Earth Sciences Div.
REACTION OF HYDROGEN SULFIDE WITH OXYGEN IN THE PRESENCE OF SULFITE
Oleh Weres and Leon Tsao 14 Jan. 1983 84 p refs
(Contract DE-AC03-76SF-00098)
(DE83-011132; LBL-11377) Avail: NTIS HC A05/MF A01

Commonly, abatement of hydrogen sulfide emission from a geothermal powerplant requires that hydrogen sulfide dissolved in the cooling water be eliminated by chemical reaction. Oxidation by atmospheric oxygen is the referred reaction, but requires a suitable catalyst. Nickel is the most potent and thereby cheapest catalyst for this purpose. One mg/L nickel in the cooling water would allow 99% removal of hydrogen sulfide to be attained. A major drawback of catalytic air oxidation is that colloidal sulfur is a major reaction product; this causes rapid sludge accumulation and deposition of sulfur scale. We studied the kinetics and product distribution of the reaction of hydrogen sulfide with oxygen, catalyzed by nickel. Adding sodium sulfite to the solution completely suppresses formation of colloidal sulfur by converting it to thiosulfate. The oxidation reaction is an autocatalytic, free radical chain reaction. A rate expression for this reaction and a detailed reaction mechanism were developed. Nickel catalyzes the chain initiation step, and polysulfidoradical ions propagate the chains. Several complexes of iron and cobalt were also studied. Iron citrate and iron N-hydroyFDTA are the most effective iron based catalysts. Uncomplexed cobalt is as effective as nickel, but forms a precipitate of cobalt oxysulfide and is too expensive for practical use. DOE

N83-32892# Los Alamos Scientific Lab., N. Mex.
INFRARED-LASER SPECTROSCOPY, 1980 - 1983
Robin S. McDowell 1983 15 p refs Presented at the Soc. of Photo-Optical Instrumentation Engrs. Conf., Santa Fe, N. Mex., 11-15 Apr. 1983
(Contract W-7405-eng-36)
(DE83-011327; LA-UR-83-1044; CONF-830425-10) Avail: NTIS HC A02/MF A01

The status of tunable infrared sources is summarized. It is emphasized that demonstration of laser action in a given region does not always imply that a useful spectroscopic tool was developed. Those regions in which the results of high resolution spectroscopic studies have actually been reported using various tunable infrared lasers are shown. DOE

N83-32893# Sandia Labs., Albuquerque, N. Mex.
SPECTRAL AND SPATIAL STUDIES OF SHOCK-INDUCED LUMINESCENCE FROM QUARTZ
Paul J. Brannon, Carl H. Konrad, Robert W. Morris, Eric D. Jones, and James R. Asay Feb. 1983 84 p refs
(Contract DE-AC04-76DP00789)
(DE83-008424; SAND-82-2469) Avail: NTIS HC A05/MF A01

Spatial and spectral studies of shock induced luminescence from both fused and crystalline quartz as a function of stress level revealed the following information: crystalline x-cut quartz has a threshold for emission near the dynamic yield point (about 6 GPa). Fused quartz has a threshold near 16 GPa which is not the dynamic yield point (approximately 10 GPa). The spatial distribution of the luminescence from x-cut quartz changes from emission along discrete lines to emission uniformly over the sample as the stress level increases from 6 to 8 GPa. The spatial distribution for fused quartz is uniform with large scale areas where no emission is observed. The spectra of emission from both fused and x-cut quartz are band like rather then blackbody. Crystalline x-cut quartz has emission peaks near 400 and 600 nm and fused quartz has a dominant 600 nm peak with a minor peak near 400 nm. A change in the 400 nm emission with time can be correlated to wave interaction times. A discussion of the luminous emission in terms of yielding and other physical mechanisms is given. DOE

N83-32894# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.
HIGH-PRESSURE PHASE EQUILIBRIA FOR THE WATER/METHANE SYSTEM
Eldon R. Larsen and John M. Prausnitz Jan. 1983 56 p refs Presented at the Am. Inst. of Chem. Engrs. Natl. Meeting, Houston, Tex., 27-31 Mar. 1983
(Contract DE-AC03-76SF-00098)
(DE83-009055; LBL-15501; CONF830308-7) Avail: NTIS HC A04/MF A01

A semitheoretical method was established for superimposing the residual thermodynamic properties of pure methane and of pure water over wide rangs of pressure (0.01 to 1000 MPa) and temperature (triple point to twice the critical temperature). Using reasonable mixing rules with two binary parameters, this superposition also gives mixture properties, including high pressure vapor liquid equilibria. DOE

N83-32895# California Univ., Livermore. Lawrence Livermore Lab.
EXPERIMENTS IN NUMERICAL METHODS FOR A PROBLEM IN COMBUSTION MODELING
George D. Byrne (Pittsburgh Univ.) and Alan C. Hindmarsch 29 Dec. 1982 49 p refs
(Contract W-7405-eng-48)
(DE83-010301; UCRL-53375) Avail: NTIS HC A03/MF A01

The use of the numerical method of lines which can be used effectively to solve time dependent combustion models in one spatial dimension was shown. The numerical method of lines (NMOL) means the reduction of a system of partial differential equations to a system of ordinary differential equations (ODE's), followed by the solution of this ODE system with an appropriate ODE's), followed by the solution of this ODE system with an appropriate ODE solver. Finite differences were used for the spatial discretization and a variate of the GEAR package for the ODE's. Various solution methods of interest for the nonlinear algebraic system in this setting are presented in the corrector iteration section of the GEAR package applied to combustion models. These methods have in common their lack of frequent use in ODE software and their ready applicability to partial differential equations in more than spatial dimension. The more promising nonlinear system solvers for the NMOL solution of combustion models are indicated. The purposes are to: demonstrate the feasibility and accuracy of the numerical method of lines, in comparison with a splitting scheme, for a one dimensional combustion model; to discuss various approaches to the problem of solving the algebraic systems that arise from implicit methods; and to show that the numerical methods described are applicable to multidimensional problems and to other transport models. DOE

N83-32896# Los Alamos Scientific Lab., N. Mex.
NONLINEAR OPTIMIZATION APPLIED TO CHEMICAL-EQUILIBRIUM PROBLEMS
W. J. Parkinson and J. G. Sanderson Mar. 1983 36 p refs
(Contract W-7405-eng-36)
(DE83-009631; LA-9670-MS) Avail: NTIS HC A03/MF A01

Computational procedures for solving nonlinear complex chemical equilibrium problems were investigated. Two problems were chosen. Problem 1 dealt with the methanation reaction and the water gas shift reaction. Problem 2 dealt with three coal gasification reactions, hydrogen and oxygen reacting with pure carbon. The problem solution is equilibrium composition at a given temperature and pressure. Each problem was posed in three different ways: (1) the K value method solved by Newton's method; (2) minimization of Gibbs free energy as a constrained minimization problem with Lagrange multipliers using Newton's method to find the roots; and (3) minimization of the system Gibbs free energy as an unconstrained optimization problem, with constraints added as penalty functions. The function minimum was sought using a quasiNewton method. Problem 1 was solved by methods 1 and 2, but could not be solved by method 3. Problem 2 was solved by method 1 only if simplifying assumptions were made. Method 2 solved problem 2 if the initial guess was close to the solution. Method 3 sometimes found an approximate solution to Problem 2. DOE

N83-32897# Ames Lab., Iowa. Dept. of Chemistry.
ANALYSIS OF SOLIDS BY SPARK-SOURCE AND LASER MASS SPECTROMETRY
Robert J. Conzemius and Harry J. Svec 1982 11 p refs Presented at the Univ. Series on Ceramic Sci. Advances in Mater. Characterization, Alfred, N.Y., 15-18 Aug. 1982
(Contract W-7405-eng-82)
(DE83-009065; IS-M-403; CONF-820891-7) Avail: NTIS HC A02/MF A01

The operation, applications, and state of the art of spark source mass spectrometry are discussed. The operation development, and capabilities of laser mass spectrometry of solids are described. Ranges of laser parameters, general features of the types of mass spectrometers, and some results of laser mass spectrometers are given. DOE

N83-32898# Department of Energy, Washington, D. C. Materials Sciences Div.
MATERIALS PREPARATION AND CHARACTERIZATION CAPABILITIES
Feb. 1983 218 p refs Presented at the Conf. on Mater. Preparation and Characterization Capabilities, Oak Ridge, Tenn., 16 Nov. 1982
(Contract W-7405-eng-26)
(DE83-009722; CONF-821120) Avail: NTIS HC A10/MF A01

Laboratory tests on materials preparation techniques and capabilities, and materials characterization techniques are reported. Topics discussed are: description of the unique capabilities existing at each laboratory; to achieve greater coherence and effectiveness in material science programs; information dissemination, by documentation identification of areas for interdisciplinary and interlaboratory cooperative efforts. DOE

N83-32899# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.
ELECTROCHEMICAL MACHINING OF CEMENTED TITANIUM CARBIDE M.S. Thesis

Corinne A. Coughanowr, Rolf H. Muller, and Charles W. Tobias Aug. 1982 139 p refs
(Contract DE-AC03-76SF-00098)
(DE83-009058; LBL-13682) Avail: NTIS HC A07/MF A01

The electrochemical machining (ECM) of a cemented titanium carbide/10% nickel composite was investigated and compared to the ECM of the pure components, TiC and Ni. All three materials were machined in 2M KNO3 electrolyte, under current densities ranging from 17 to 100 A/cm(2). It is found that the FCM behavior of the TiC/Ni composite is intermediate to that of its components. The apparent valences of dissolution for all three materials are independent of current density in the range studied: 2.8 eq/qmol for Ni, and 6.6 and 6.5 eq/qmol for TiC and TiC/Ni, respectively. Linear cell voltage versus current density relationships are obtained for all three materials. Surface analysis of the TiC/Ni composite shows preferential dissolution of the TiC phase over the nickel phase for the entire range of operating conditions investigated. DOE

N83-32900# State Univ. of New York, Brooklyn. Dept. of Physics.
OPTICAL AND ELECTROCHEMICAL INVESTIGATION OF RUTHENIUM AND IRIDIUM AND THEIR OXIDES IN RELATION TO THEIR ELECTROCATALYTIC ACTIVITY Progress Report
Fred H. PollAk Feb. 1983 46 p refs
(Contract DE-AC02-80ER-10654)
(DE83-006563; DOE/ER-10654/T1) Avail: NTIS HC A03/MF A01

Large crystals of RuO2 were grown. Raman spectra and magnetic susceptibility of single crystal RuO2 were measured. Electrochemical investigations of single crystal RuO2 included cyclic voltammetry, hydrogen adsorption/desorption reactions, potential of zero charge, ad chlorine evolution reaction. A study of the surface structures of RuO2 (110) and (100) was begun using LEED, AES, and ZPS. DOE

N83-32901# California Univ., Berkeley. Lawrence Berkeley Lab.
VACUUM ETHANOL DISTILLATING TECHNOLOGY
B. L. Maiorella, B. W. Blanch, and C. B. Wilke Mar. 1983 166 p refs Sponsored in part by Midwest Research Inst.
(Contract DE-AC03-76SF-00098)
(DE83-011082; LBL-15752) Avail: NTIS HC A08/MF A01

The design principles for one particularly efficient distillation arrangement employing available technology are illustrated. The newly developed temperature dependent UNIQUAC vapor/liquid equilibrium computation methods are utilized in the design of a minimum cost distillation plant for the production of 100 million liters per year of 96 wt % ethanol product. Vacuum distillation and vapor reuse methods are employed. These methods combine synergistically to reduce the distillation energy requirement in concentrating dilute beer feeds. The vapor reuse methods are then extended to demonstrate how 99.9 wt % ethanol are then produced at virtually no additional energy cost. DOE

N83-32902# Worcester Polytechnic Inst., Mass. Dept. of Chemistry.
THE GAS-PHASE RADIOLYSIS AND VACUUM-ULTRAVIOLET PHOTOLYSIS OF HETEROCYCLIC ORGANIC COMPOUNDS
Alfred A. Scala 1982 20 p refs
(Contract DE-AC02-76ER-03569)
(DE83-007850; DOE/ER-03569-T2) Avail: NTIS HC A02/MF A01

The processes by which complex organic molecules react when they absorb large amounts of energy were investigated. The results are described of recent work in three areas: (1) vacuum ultraviolet photolyses; (2) ion molecule reactions in gaseous ve. solution phase; (3) structure reactivity correlations in ion molecule reactions of organic heterocycles. DOE

N83-32903# Centro Informazioni Studi Esperienze, Milan (Italy). Documentation Service.
REAL TIME COHERENT ANTI-STOKES RAMAN SPECTROSCOPY (CARS) IN A SEMI-INDUSTRIAL FURNACE
A. Ferrario, M. Garbi, and C. Malvicini 1983 16 p refs Presented at CLEO 83 Conf. on Lasers and Electro-Opt., Baltimore, 17-20 May 1983
(Contract CSM-CISE-42558)
(CISE-2042) Avail: NTIS HC A02/MF A01

The Coherent Anti-Stokes Raman Spectroscopy (CARS) technique is described, and measurements on a small methane furnace and a large furnace fed by various fuels are discussed. Results show that reliable operation of the CARS spectrometer is possible, with extraction of real time, precise quantitative temperature and concentration measurements even from large, sooty flames. The density gradients caused by turbulence do not cause a significant loss in Anti-Stokes signal generation efficiency. However, laser beam wandering forced the use of an optical fiber with a 10 to 20 loss factor in the coupiing with the available polychromator, and limited the applicability of BOXCARS single shot techniques. This difficulty can be overcome by using a higher peak power laser and a shorter focal length polychromator. The consequent reduction of the spectral resolution should not affect measurement accuracy. Author (ESA)

N83-32904# Lenox Inst. for Research, Inc., Mass.
RAPID AND ACCURATE DETERMINATION OF OIL AND GREASE BY SPECTROPHOTOMETRIC METHODS Research Report, Jun. 1982 - Feb. 1983
Lawrence K. Wang and Aimee E. Thayer 14 Feb. 1983 33 p refs Sponsored in part by Krofta Engineering Corp., Lenox, Mass.
(PB83-180760; LIR/02-83-1) Avail: NTIS HC A03/MF A01 CSCL 07D

Three spectrophotometric/colorimetric procedures have been developed for rapid determination of hydrocarbons, vegetable oils, animal fats, waxes, soaps, greases and related matter in aqueous phase. The analytical procedures are applicable to measurement of most light petroleum fuels, although loss of some of any gasoline present during the extraction manipulations can be expected. Author (GRA)

N83-32905# Illinois Inst. of Tech., Chicago. Dept. of Chemical Engineering.
FLUIDIZATION USING NON-EQUILIBRIUM THERMODYNAMICS Final Report, 1 Jul. 1981 - 30 Jun. 1982
Dimitri Gidaspow Jun. 1982 115 p refs Sponsored by Gas Research Inst.
(PB83-195438; GRI-81/0131) Avail: NTIS HC A06/MF A01 CSCL 21B

A hydrodynamic theory of fluidization was developed and compared with experimental evidence. A hydrodynamic theory of fluidization will permit a more rational scale up of many coal conversion processes. In this approach the mixing of the solids and gases is theoretically determined rather than expressed in terms of empirically determined transfer coefficients as is done in most modeling studies dealing with reactor scale up and design. GRA

N83-33258# Academy of Sciences (USSR), Moscow.
A CORRECT METHOD OF CALCULATING ANALYTICAL DATA FOR BIOGEOCHEMICAL MONITORING
M. N. Yakovleva *In its* Geosystem Studies for Monitoring 1981 p 160-166 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

N83-33667# Tokyo Denki Univ. (Japan).
EFFECT OF DEPOSITION CONDITIONS ABOUT PHOTOCHROMIC PROPERTIES OF AgBr-SnO2 MIXTURE FILMS
Yoichi Abe *In its* Res. Repts. of the Fac. of Eng., Tokyo Denki Univ., No. 30 Dec. 1982 p 145-158 refs In JAPANESE; ENGLISH summary (For primary document see N83-33656 21-70)
Avail: NTIS HC A08/MF A01

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N83-32906 Stanford Univ., Calif.
NEAR THRESHOLD CORROSION FATIGUE CRACK GROWTH BEHAVIOR OF A NICKEL BASE SUPERALLOY IN AIR AND INERT ENVIRONMENTS Ph.D. Thesis
James Lum Yuen 1982 226 p
Avail: Univ. Microfilms Order No. DA8301287

The near threshold fatigue crack growth behavior of Alloy 718 was studied in an air environment with relative humidity of 50 to 65% and in a helium environment at temperatures ranging from 24 C to 649 C. The tests were performed at load ratios of 0.1 and 0.5 at a frequency of 100 Hz with a sinusoidal waveform. The fatigue crack growth behavior was found to be dependent on the interactions between the local plastic deformation at the crack tip and the environment. The environmental effects can either accelerate or decelerate fatigue crack growth. It was found that at intermediate growth rates, .00005 to .001 mm/cycle, fatigue crack growth is accelerated by environmental effects whereas in the near threshold regime, below .00005 mm/cycle, fatigue crack growth is decelerated. At intermediate growth rates, the increase in growth rates with increasing temperature are attributed to the effects of the environment and the decrease in elastic modulus and yield stress with increasing temperature. Dissert. Abstr.

N83-32907 Defence Research Information Centre, Orpington (England).
STRAIN HARDENING FEATURES OF POLYCRYSTALLINE TUNGSTEN
L. K. Gordienko and V. M. Panovko Apr. 1983 32 p refs Transl. into ENGLISH of Fiz. i Khim. Obrabotki Materialov (USSR), no. 4, 1971 p 61-70
(DRIC-T-6959; BR87945) Copyright. Avail: Issuing Activity

Hardening coefficients (n) for polycrystalline tungsten in different structural condition at temperatures from 200 to 1100 C were determined. The value of n as a function of degree of strain and test temperature was analyzed. Results show that strain hardening of recrystallized tungsten at low strain levels (15 to 20%) proceeds in two stages. Transition from first to second stage occurs where the grain size of the initial specimen is proportional to the initial strain. The test temperature at which ultimate strain corresponding to transition from first to second hardening stage is achieved does not depend on the structural factor, this being constant for the investigated grain size range. Author (ESA)

N83-32908*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
TIME DEPENDENCE OF SOLID-PARTICLE IMPINGEMENT EROSION OF AN ALUMINUM ALLOY
P. VeerabhadraRao and Donald H. Buckley Aug. 1983 24 p refs Presented at 6th Intern. Conf. on Erosion by Liquid and Solid Impact, Cambridge, England, 4-8 Sep. 1983
(NASA-TP-2169; E-1381; NAS 1.60:2169) Avail: NTIS HC A02/MF A01 CSCL 11F

Erosion studies were conducted on 6061-T6511 aluminum alloy by using jet impingement of glass beads and crushed glass particles to investigate the influence of exposure time on volume loss rate at different pressures. The results indicate a direct relationship between erosion-versus-time curves and pitmorphology (width, depth, and width-depth ratio)-versus-time curves for both glass forms. Extensive erosion data from the literature were analyzed to find the variations of erosion-rate-versus-time curves with respect to the type of device, the size and shape of erodent particles, the abrasive charge, the impact velocity, etc. Analysis of the experimental data, obtained with two forms of glass, resulted in three types of erosion-rate-versus-time curves: (1) curves with incubation, acceleration, and steadystate periods (type 1); (2) curves with incubation, acceleration, decleration, and steady-state periods (type 3); and (3) curves with incubation, acceleration, peak rate, and deceleration periods (type 4). The type 4 curve is a less frequently seen curve and was not reported in the literature. Analysis of extensive literature data generally indicated three types of erosion-rate-versus-time curves. Two types (types 1 and 3) were observed in the present study; the third type involves incubation (and deposition), acceleration, and steady-state periods (type 2). Examination of the extensive literature data indicated that it is absolutely necessary to consider the corresponding stages or periods of erosion in correlating and characterizing erosion resistance of a wide spectrum of ductile materials. S.L.

N83-32909# Pennsylvania State Univ., University Park. Dept. of Chemistry.
PROPERTIES OF REACTIVE SPECIES GENERATED AT HIGH TEMPERATURES AND THEIR LOW TEMPERATURE REACTIONS TO FORM NOVEL SUBSTANCES Final Report
P. S. Skell 1983 13 p refs
(Grant AF-AFOSR-0063-79; AF Proj. 2303)
(AD-A127052; AFOSR-83-0240TR) Avail: NTIS HC A02/MF A01 CSCL 07/3

Reactions of iron, cobalt, nickel, palladium and zirconium atoms with unsaturated hydrocarbons are described. Preliminary studies of a number of other atoms are described: Th, Rh, Nb, Ta.
Author (GRA)

N83-32910# Johns Hopkins Univ., Baltimore, Md. Center for Materials Research.
CHARACTERIZATION OF RAPIDLY SOLIDIFIED ALLOYS Semiannual Report
D. Shechtman and Emanuel Horowitz Feb. 1983 82 p refs
(Contract MDA903-81-C-0555)
(AD-A128012; CMR-DARPA-RSA-6) Avail: NTIS HC A05/MF A01 CSCL 11/6

Various microstructural aspects of rapid solidification of metallic systems which are based on aluminum (Al-Fe, Al-Mn, and Al-Cu), silver base (Ag-Cu) and the quasibinary eutectic NiAl-Cr are discussed. R.J.F.

N83-32911# Naval Research Lab., Washington, D. C.
EVALUATION AND PREDICTION OF NEUTRON EMBRITTLEMENT IN REACTOR-PRESSURE-VESSEL MATERIALS Final Report
J. R. Hawthorne, B. H. Menke, F. J. Loss, H. E. Watson, A. L. Hiser, and R. A. Gray Dec. 1982 170 p refs Sponsored by EPRI
(EPRI Proj. 886-2)
(DE83-901107; EPRI-NP-2782) Avail: NTIS HC A08/MF A01

This study evaluates the effects of fast neutron irradiation on the mechanical properties of eight nuclear reactor vessel materials. The materials include submerged arc weldments, three plates, and one forging. The materials are in the unirradiated and irradiated conditions with regard to tensile, Charpy impact, and static and dynamic fracture toughness properties. Correlations between impact and fracture toughness parameters are developed from the experimental results. The observed shifts in transition temperature and the drop in upper shelf energy are compared with predictions developed from the Regulatory Guide 1.99.1 trend curves. DOE

N83-32912# Pacific Northwest Lab., Richland, Wash.
EVALUATING THE INTERGRANULAR SCC RESISTANCE OF SENSITIZED TYPE 304 STAINLESS STEEL IN LOW TEMPERATURE WATER ENVIRONMENTS
S. M. Bruemmer, R. H. Jones, J. R. Divine, and A. B. Johnson, Jr. Apr. 1983 27 p refs Presented at the ASTM Symp. on Environ. Sensitive Fracture, Gaithersburg, Md., 25 Apr. 1982
(Contract DE-AC06-76RL-01830)
(DE83-003300; PNL-SA-10053; CONF-820495-1) Avail: NTIS HC A03/MF A01

The resistance of sensitized AISI Type 304 stainless steel to intergranular stress-corrosion cracking (IGSCC) in 32 C water environments has been investigated using constant axial load (CAL), constant extension rate (CER), U-bend and crevice corrosion tests. Constant load tests were found to give a better simulation

of a service failure and produced IGSCC under a wider range of conditions than CER or U-bend tests. Intergranular SCC of welded and furnace-sensitized Type 304 specimens was observed in CAL experiments in both deionized and borated water with ppM level chloride additions. Constant extension rate tests also produced IGSCC but only in welded pipe specimens with the original ground and welded surfaces intact. If the original ID and OD surfaces were removed, fracture surfaces showed ductile, microvoid coalescence appearances. No evidence of SCC or significant corrosive attack was found in U-bend or crevice corrosion tests after more than six months in dilute chloride environments at temperatures of 30 or 50 C. DOE

N83-32913# Princeton Univ., N. J. Plasma Physics Lab.
ENHANCED SELECTIVE HYDROGEN DESORPTION FROM METALS
R. J. Knize and J. L. Cecchi Dec. 1982 12 p refs
(Contract DE-AC02-76CH-03073)
(DE83-003901; PPPL-1941) Avail: NTIS HC A02/MF A01

The thermal desorption of hydrogen isotopes from a metal is usually a second order process, the rate for which becomes asymptotically slow. A method for enhancing the desorption rate of one particular isotope by maintaining a constant pressure of another molecular species is presented. This results in an effective first order desorption and concomitant exponential decay of the concentration of the selected isotope. Data are presented for the enhanced desorption of deuterium from a Zr-Al getter. The results agree well with a theoretical model, which is discussed. This enhanced desorption method should be particularly useful for tritium operation in the Tokamak Fusion Test Reactor. DOE

N83-32914# Massachusetts Inst. of Tech., Cambridge.
EFFECT OF NEUTRON IRRADIATION ON THE TITANIUM CARBIDE DISTRIBUTION IN RAPIDLY SOLIDIFIED AUSTENITIC STAINLESS STEELS OF VARYING TITANIUM AND CARBON CONTENT
D. Imeson, C. H. Tong, J. B. VanderSande, and O. K. Harling 1982 11 p refs Presented at TMS/AIME Fall Meeting, St. Louis, 24 Oct. 1982
(Contract DE-AC02-78ER-10107)
(DE83-002802; DOE/ER-10107/16; CONF-821049-6) Avail: NTIS HC A02/MF A01

Titanium modified austenitic stainless steels are one of the prime candidate alloys being examined for irradiation performance for fusion applications. An aspect of considerable importance in the alloy design is the optimum distribution of titanium carbide in the preirradiation microstructure and the changes in distribution that occur upon irradiation. Rapid solidification (RS) techniques are being used to prepare materials, including alloys with increased TiC content, as part of an examination of the utility of RS methods in siding the development of irradiation resistant materials. This report considers experimental determinations of the titanium carbide distribution in the irradiated alloys, and the role it has to play in the development of the microstructural state. It is shown that the carbides tend to dissolve upon irradiation and in addition, if larger than about 10 nm, cause nickel and silicon segregation sufficient to nucleate another phase on the carbide particle. DOE

N83-32915# Oak Ridge National Lab., Tenn.
EFFECTS OF HEAT TREATMENT ON MICROSTRUCTURAL AND MECHANICAL PROPERTIES OF CHROMIUM-MOLYBDENUM STEELS
D. O. Hobson, R. W. Swindeman, D. N. Robinson, R. K. Nanstad, and R. L. Klueh 1982 7 p Presented at the 7th Mater. for Coal Conversion and Utilization Conf., Gaithersburg, Md., 16 Nov. 1982
(Contract W-7405-eng-26)
(DE83-003449; CONF-821145-3) Avail: NTIS HC A02/MF A01

Charpy test specimens were machined from the ingot of V-Ti-B modified 2-1/4 Cr-1-Mo steel. Continuous cooling transformation curves were obtained for the steel, and constant stress creep tests are being conducted. Microstructure for the modified and unmodified steels are being studied. DOE

N83-32916# Brookhaven National Lab., Upton, N. Y.
IDENTIFICATION OF CREVICE CORROSION IN THE TITANIUM ALLOY TICODE-12 IN SIMULATED ROCK SALT BRINE AT 150 DEG C
T. M. Ahn, B. S. Lee, and P. Soo 1982 20 p refs Presented at the ASTM Conf. on Titanium and Zirconium in Industrial Applications, New Orleans, 21 Sep. 1982
(Contract DE-AC02-76CH-00016)
(DE83-002819; BNL-NUREG-32107; CONF-820955-2) Avail: NTIS HC A02/MF A01

TiCode:12 (Ti-0.3Mo-0.8Ni) is a prime corrosion resistant material for high level nuclear waste containers which will be emplaced in mined geologic repositories such as those in rock salt. The crevice corrosion behavior of this alloy was investigated in simulated rock salt brine solutions at a temperature of 150 C. A distinct corrosion product with a range of interference colors was observed in a mechanically simulated crevice after two to four weeks' exposure. Low pH accelerated the reaction rate and deaerated solutions give less corrosion than aerated ones. Also, increasing specimen size, decreasing crevice gap, and preoxidation of the cathodic area gave more voluminous corrosion products inside the crevice. High temperature did not necessarily accelerate crevice corrosion. These results are consistent with those expected from macroscopic concentration cell formation accompanied by oxygen depletion, potential drop, and acidification inside the crevice. DOE

N83-32917# Brookhaven National Lab., Upton, N. Y. Corrosion Science Group.
TESTS WITH INCONEL 600 TO OBTAIN QUANTITATIVE STRESS-CORROSION CRACKING DATA FOR EVALUATING SERVICE PERFORMANCE
R. Bandy and D. vanRooyen Sep. 1982 11 p Presented at the 10th Water Reactor Safety Res. Inform. Conf., Gaithersburg, Md., 12 Oct. 1982
(Contract DE-AC02-76CH-00016)
(DE83-002102; BNL-NUREG-31814; CONF-821037-39) Avail: NTIS HC A02/MF A01

Inconel 600 tubes in pressurized water reactor (PWR) steam generators form a pressure boundary between radioactive primary water and secondary water which is converted to steam and used for generating electricity. Under operating conditions the performance of alloy 600 has been good, but with some occasional small leaks resulting from stress corrosion cracking (SCC), related to the presence of unusually high residual or operating stresses. The suspected high stresses can result from either the deformation of tubes during manufacture, or distortion during abnormal conditions such as denting. The present experimental program addresses two specific conditions, i.e., (1) where deformation occurs but is no longer active, such as when denting is stopped and (2) where plastic deformation of the metal continues, as would occur during denting. Laboratory media consist of pure water as well as solutions to simulate environments that would apply in service; tubing from actual production is used in carrying out these tests. DOE

N83-32918# Brookhaven National Lab., Upton, N. Y. Dept. of Nuclear Energy.
RESISTANCE OF NITROGEN-CONTAINING STAINLESS ALLOYS TO CORROSION IN CHLORIDE MEDIA
R. Bandy and D. vanRooyen 1982 6 p refs Presented at the DOE Geothermal Eng. and Mater. Program Conf., San Diego, Calif., 6 Oct. 1982
(Contract DE-AC02-76CH-00016)
(DE83-003718; BNL-31847; CONF-821075-2) Avail: NTIS HC A02/MF A01

The pitting resistance of a series of experimental stainless steels with varying amounts of nickel, chromium, molybdenum, manganese and nitrogen and a number of commercial stainless steels and nickel based alloys were studied in highly concentrated chloride media. The results show that nitrogen enhances the pitting resistance of stainless steel and exceptional corrosion resistance

is achieved with high levels of nitrogen in combination with suitable amounts of molybdenum and chromium. DOE

N83-32919# Brookhaven National Lab., Upton, N. Y. Corrosion Science Group.

CATHODIC PROTECTION OF CARBON STEEL IN SIMULATED GEOTHERMAL ENVIRONMENTS

R. Bandy and D. vanRooyen 1982 6 p refs Presented at the DOE Geothermal Eng. and Mater. Program Conf., San Diego, Calif., 6 Oct. 1982

(Contract DE-AC02-76CH-00016)

(DE83-003719; BNL-31846; CONF-821075-3) Avail: NTIS HC A02/MF A01

The applicability of cathodic protection to mitigate corrosion of carbon steel in two different environments containing H2S was investigated using impressed current and sacrificial anode techniques. Results of impressed current tests conducted under potential control shows that the weight loss is reduced significantly by shifting the potential of the metal 60 to 80 mV cathodic to the open circuit potential. The relationship between the applied current and the potential shift shows that the current requirement does not necessarily increase with the voltage shift, thus implying that the cost of cathodic protection may not increase in proportion to the protection achieved. The feasibility of using zinc as a sacrificial anode in the environment of interest was also studied. DOE

N83-32920# Virginia Polytechnic Inst., Blacksburg.

METALLOGRAPHIC STUDIES OF HYDROGEN-EMBRITTLED AISI TYPE 1018 STEEL

J. A. Wagner, M. R. Louthan, III, and M. R. Louthan, Jr. 1982 21 p refs Presented at the 15th Ann. Intern. Metallographic Soc. Meeting, Orlando, Fla., 18 Jul. 1982

(Contract DE-AS05-78ER-06039)

(DE83-001525; DOE/ER-06039/2; CONF-820724-5) Avail: NTIS HC A02/MF A01

Metallographic and fractographic studies of American Iron and Steel Institute Type 1018 steel disks, pressurized to rupture in either hydrogen or oxygen gas showed that the adverse effects of hydrogen were influenced by the inclusion content of the steel. The hydrogen embrittlement processes initiate at surface defects and inclusion stringers. The embrittlement sequence then involves a complicated interaction between these failure initiation sites, the availability of hydrogen and the test strain rate. Final failure can occur by either microvoid coalescence or decohesion type mechanisms. DOE

N83-32921# Exxon Research and Engineering Co., Linden, N.J.

TRIBOLOGICAL PROPERTIES OF ION-IMPLANTED 52100 STEEL

T. E. Fischer, M. J. Luton, J. M. Williams (ORNL), C. W. White (ORNL), and B. R. Appleton (ORNL) 1982 36 p refs Presented at the ASME/ASLE Joint Lubrication Conf., Washington, D.C., 5 Oct. 1982

(Contract W-7405-eng-26)

(DE83-001969; CONF-821086-1Draft) Avail: NTIS HC A03/MF A01

Titanium, argon, nitrogen, and iron were implanted in separate strips on a ferritic AISI E52100 cylinder. Three implant energies were chosen to obtain a continuous distribution from the surface to a depth of 120 nm and total doses were 4 x 10 to the 17th power ions sq cm. The friction coefficient and wear track morphology were measured by sliding against a martensitic AISI 52100 steel ball in air, in a fully formulated lubricant and in highly purified hexadecane. In dry sliding, titanium reduced the friction coefficient to 0.32 and suppressed the near-surface cracking, in agreement with previous work at Harwell and Naval Research Labs. In hexadecane, titanium reduced the friction coefficient to 0.22, iron and nitrogen increased it to 0.7 from 0.55 and all implants decreased wear. In the fully formulated lubricant, only the break-in pattern was modified. Auger measurements showed that carbon penetrated the material with all implants, creating TiC in the Ti implanted strip and presumably strengthening the other implanted areas by carbide precipitates. 10 figures. DOE

N83-32922# California Univ., Livermore. Lawrence Livermore Lab.

THERMAL-OUTGASSING BEHAVIOR OF ELECTRODEPOSITED BLACK CHROMIUM

T. G. Beat and W. K. Kelley 24 Jan. 1983 13 p refs Presented at the 70th Ann. Tech. Conf. on the Am. Electroplaters' Soc., Indianapolis, 26-30 Jun. 1983

(Contract W-7405-eng-48)

(DE83-006409; UCRL-82797-REV-1; CONF-830608-1-REV-1) Avail: NTIS HC A02/MF A01

The outgassing characteristics of electrodeposited black chromium were determined because of interest in using this coating in vacuum applications. Data obtained for a variety of conditions led to the conclusion that this coating is acceptable for use in optical-transport networks and plasma-physics experiments. The outgassing rate for an unbaked coating was 3 x 10(+1)0 Torr liters/sec per square cm. DOE

N83-32923# Hahn-Meitner-Institut fuer Kernforschung, Berlin (West Germany).

SURFACE SEGREGATION IN CONCENTRATED Ni-Cu ALLOYS UNDER IRRADIATION

W. Wagner, V. Naundorf, L. E. Rehn, and H. Wiedersich May 1982 12 p refs Presented at the 11th Intern. Symp. on Effects of Radiation on Mater., ASTM, Scottsdale, Ariz., 28-30 Jun. 1982 Prepared in cooperation with Argonne National Lab., Ill.

(Contract W-31-109-eng-38)

(DE83-007678; CONF-820628-22) Avail: NTIS HC A02/MF A01

Radiation-Induced Segregation (RIS) was investigated in concentrated Ni-Cu alloys is a temperature range between 470 and 6100 C. Depth profiling using Auger Electron Spectroscopy as well as in situ Rutherford Backscattering Spectrometry revealed significant segregation of Ni to the surface during ion irradiation. The width of the segregated region was found to increase with increasing temperature, extending to approx. 170 nm at 6100C. A post irradiation annealing experiment is presented to show that the segregation is radiation-induced. The results are discussed in the framework of current models of RIS with the aim of identifying the possible origin of the segregation. DOE

N83-32924# Brookhaven National Lab., Upton, N. Y.

DISSOLUTION AND PASSIVATION KINETICS OF Fe-Cr-Ni ALLOYS DURING LOCALIZED CORROSION

R. C. Newman and H. S. Isaacs 1983 7 p refs Presented at the 5th Intern. Symp. on Passivity, Bombannes, France, 30 May 1983

(Contract DE-AC02-76CH-00016)

(DE83-010430; BNL-32796; CONF-830534-1) Avail: NTIS HC A02/MF A01

An artificial pit technique has been used to study the anodic and cathodic behavior of Fe-Cr-Ni alloys during localized corrosion in neutral chloride solutions. The active dissolution kinetics have been determined as a function of the concentration of the localized environment, and the conditions for passivation established. Platinum microelectrodes have been used to analyze the pit solutions. The cathodic behavior of a pit on type 304L stainless steel is dominated by copper ions dissolved in the pit. A high purity Fe-Cr-Ni alloy behaves like stainless steel in the pit. A high purity Fe-Cr-Ni alloy behaves like stainless steel if copper is separately dissolved in the pit environment. The variation of dissolution rate with concentration of corrosion products is used to show that localized corrosion can involve as many as five diffusion-coupled steady states. The stability of these states is discussed. DOE

N83-32925# Sandia Labs., Albuquerque, N. Mex. Applied Physics Div.

PERMEABILITY OF HYDROGEN ISOTOPES THROUGH NICKEL-BASED ALLOYS

Ellen M. Edge and Dean J. Mitchell Apr. 1983 21 p refs

(Contract DE-AC04-76DP-00789)

(DE83-009672; SAND-83-0500) Avail: NTIS HC A02/MF A01

Permeabilities and diffusivities of deuterium in several nickel-

based alloys were measured in this investigation. Measurements were made by the gas-phase breakthrough technique in the temperature range 200 to 4500 C with applied pressures ranging from 1 to 100 kPa. The results were extrapolated to predict the permeabilities (K) of the alloys at room temperature. The alloy with the smallest deuterium permeability is Carpenter 49, for which K = 4.3 x 10(+18) mol s(+1) m(+1) Pa(+)/sup 1/2/ at 220 C. The permeability of deuterium in Kovar or Ceramvar is about 80% greater than that for Carpenter 49. Permeabilities of Inconel 625, Inconel 718, Inconel 750 and Monel K-500 are all equal to about 5 x 10(+17) mol m(+) s(+1) Pa(+)/sup 1/2/ at 220 C. The validity (from a statistical standpoint) of the extrapolation of the permeabilities to room temperature is considered in detail. Published permeabilities of stainless steels and nickel-iron alloys are also reviewed. The greatest differences in permeabilities among the nickel-based alloys appear to be associated with the tendency for some alloys to form protective oxide layers. Permeabilities of deuterium through laminates containing copper are smaller than for any of the iron-nickel alloys. DOE

N83-32926# California Inst. of Tech., Pasadena. Lab. of Engineering.
STRUCTURE OF GLASSY EARLY-TRANSITION METAL - LATE TRANSITION-METAL HYDRIDES
W. L. Johnson and K. Samwer (Goettingen Univ., W. Germany) Jan. 1983 26 p refs
(Contract DE-AT03-81ER-10870)
(DE83-010931; CALT-822-139) Avail: NTIS HC A03/MF A01

Hydrogen which is used as a probe to obtain structural information on metallic glasses was studied. Results from experimental radial distribution functions of hydrided and unhydrided Zr3Rh and Zr2Pd glasses show a significant change in the nearest neighbor distance of Zr atoms. It is suggested that hydrogen occupies mainly tetrahedral sites defined by four Zr atoms under normal hydriding conditions. A statistical model for these sites based on current dense random packing models is in agreement with the observed absorption capacity for hydrogen. It is predicted that H-H interaction should limit the upper value of hydrogen content in Zr based glasses to 2.5 (H/metal atom). DOE

N83-32927# Bettis Atomic Power Lab., West Mifflin, Pa.
STRESS-CORROSION CRACKING AND SURFACE-PITTING TESTS OF NiCrFe ALLOY BOLTS (LWBR DEVELOPMENT PROGRAM)
K. L. Keller Feb. 1983 82 p refs
(Contract DE-AC11-76PN-00014)
(DE83-011080; WARD-TM-1411) Avail: NTIS HC A05/MF A01

Accelerated corrosion tests confirmed the adequate resistance to stress corrosion cracking (SCC) of the specific heats of NiCrFe X-750 and NiCrFe 600 used as bolts in the light water breeder reactor (LWBR). Stress corrosion cracking (SCC) acceleration was achieved by running autoclave corrosion tests at 6800 F (well above the LWBR core operating temperatues of approximately 5250 F to 5600 F). Component stress levels were representative of maximum service stresses. No specimens from heats of either alloy suffered SCC. DOE

N83-32928# Mound Lab., Miamisburg, Ohio.
EFFECTS OF ATMOSPHERE AND DEW POINT ON THE WETTING CHARACTERISTICS OF A GLASS-CERAMIC ON TWO NICKEL-BASED SUPERALLOYS
D. P. Kramer and N. R. Osborne 1983 25 p refs Presented at the 7th Ann. Conf. on Composites and Advanced Ceramic Mater. Cocoa Beach, Fla., 16 Jan. 1983
(Contract DE-AC04-76DP-00053)
(DE83-009338; MLM-3054(OP)) Avail: NTIS HC A02/MF A01

Sessile drop experiments were performed for a multicomponent lithia-aluminia-silica glass ceramic on two nickel based superalloys, Inconel 718 and Hastelloy C-276. Contact angle measurements were obtained as a function of atmosphere; atmospheric dew point; and oxygen concentration. It is shown that a helium atmosphere yields the lowest contact angles between the glass and metal parts, and that, in general, the contact angles decrease as the atmospheric dew point increases. The effect of oxygen concentration on the contact angle was determined to be dependent on the particular metal alloy. DOE

N83-32929# Cornell Univ., Ithaca, N. Y.
INITIAL STAGES OF OXIDATION OF METALS AND ALLOYS Progress Report, 29 Mar. 1983
J. M. Blakely Mar. 1983 18 p
(Contract DE-AC02-79ER-10501)
(DE83-010111; DOE/ER-10501/7) Avail: NTIS HC A02/MF A01

The interaction of oxygen with single crystal Ni-Fe alloy surfaces was studied. Auger and LFFD studies indicate the coexistence of 2 dimensional oxygen rich and sulphur rich phases over ranges of temperature, coverage and composition. At a total coverage of 0.5 monolayers the S-0 system seems to exhibit a eutectic type behavior. No single mechanism fits the observations on oxidation of Be over the entire range of oxide thickness studied but it is indicated that either electron tunneling or nonlinear ionic diffusion is the rate controlling step in the continuous film region. The initial stages of oxidation of Be (0001) by measurement of ellipsometric parameters indicate 3 stages in the process. DOE

N83-32930# Brookhaven National Lab., Upton, N. Y. Corrosion Science Group.
RANKING OF ENVIRONMENTS IN STRESS-CORROSION CRACKING
R. C. Newman and R. Bandy 1983 10 p refs Presented at the 1983 Corrosion Conf., Anaheim, Calif., 18 Apr. 1983
(Contract DE-AC02-76CH-00016)
(DE83-012073; BNL-NUREG-32824; CONF-830445-2) Avail: NTIS HC A02/MF A01

Environmental aspects of sulfur induced stress corrosion cracking of sensitized alloys are described. Depending on the test technique, one perceives different environmental effects. Additions properly classed as inhibitors may appear to be promoters of SCC. Environments capable of causing very rapid SCC may appear benign because of slow crack initiation. Others are not perceived as unusually aggressive towards severely sensitized material, but maintain an exceptionally high cracking potency at low levels of sensitization. The information which can be obtained using the constant extension rate test is noted. DOE

N83-32931# California Univ., Livermore. Lawrence Livermore Lab.
USE OF LASER RAMAN SPECTROSCOPY TO STUDY HOT CORROSION OF Ni-Cr ALLOYS
J. J. Truhan and R. E. Benner (Utah Univ., Salt Lake City) Apr. 1983 10 p refs Presented at the 163rd Electrochem. Soc. Meeting, San Francisco, 8-13 May 1983 Prepared in cooperation with Sandia Labs., Albuquerque, N. Mex.
(Contract W-7405-eng-48)
(DE83-012047; UCRL-88486; CONF-830508-16) Avail: NTIS HC A02/MF A01

Raman scattering was combined with more conventional surface analytical techniques to identify corrosion species on Ni-Cr alloys after exposure to molten Na2SO4 at 10000C in air for 60 minutes. At low Cr contents, NiO is the primary oxidation product, and, at intermediate Cr contents, NiCr2O4 predominates. Higher Cr contents produce a coherent Cr2O3 scale. The sulfidation is severe for Ni-2Cr but mild for the other alloys. The degree of sulfidation for Ni-15Cr and greater is independent of alloy composition. Scanning electron microscopy and energy dispersive X-ray analysis were used to verify the Raman results. DOE

N83-32932# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.
EROSION OF HARD-METAL COATINGS
A. Levy, T. Bakker, E. Sholz, and M. Azadabeh Oct. 1982 42 p refs Presented at the TMS/AIME Meeting, Atlanta, Ga., 6-10 Mar. 1983
(Contract DE-AC03-76SF-00098)
(DE83-006747; LBL-15293; CONF-830317-1) Avail: NTIS HC A03/MF A01

The use of protective coatings on components in fossil fuel energy processes to provide thermal insulation, corrosion resistance and/or wear resistance is becoming more prevalent. In those applications where small, erosive particles occur in the environment, such as in the use of pulverized coal, erosion behavior of the coating becomes an important design consideration. The erosion of several protective, hard metal type coatings and monolithic inserts by particles entrained in an air blast has been investigated. SiC, Si3N4, tungsten carbide, and a series of nickel chromium boron alloys were tested at room temperature. The materials were fabricated by chemical vapor deposition, flame spraying, plasma arc spraying, detonation gun spraying, melting and brazing, and hot pressing. The effects of composition, morphology, method of fabrication, thickness, and surface texture on erosion behavior are discussed. The mechanisms of erosion for the different materials are defined and compared. It was determined that the materials had a wide range of erosion resistance with the fine grain size and minimum porosity materials having the lowest erosion rates. DOE

N83-32933# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.
MICROSTRUCTURES, TRANSFORMATIONS AND PROPERTIES OF OXIDATION-RESISTANT, IRON-BASE, ALUMINUM-MODIFIED ALLOYS M.S. Thesis
Gustavo Luis Tamayo Dec. 1982 64 p refs
(Contract DE-AC03-76SF-00098)
(DE83-007064; LBL-14535) Avail: NTIS HC A04/MF A01

Effects of different cooling rates on the microstructure and properties of an Fe-8A1-6Mo-0.25Nb-0.8Zr-9.10e-0.1C alloy, initially heat treated at 9000 C for one hour, were investigated. Electron diffraction and microscopy revealed in air cooled specimens a uniform distribution of second phase particles of approximately 30,000 A consisting principally of Fe, Mo, and Nb. Evidence of DO3 ordered particles was also found at this cooling rate. Oil-quenched and water-quenched specimens presented a more distorted matrix with a smaller gain size, but the presence of second phase particles was not evident. Mechanical strength and hardness were higher and ductility lower for the slowly cooled specimens. However, oxidation resistance at 10,000 C in air showed only slight variation with cooling rate, and compared favorably with two austenitic stainless steels subjected to the same treatment. It is concluded that the substitution of Al for Cr and Ni in Fe-base alloys can be made with little or no loss of favorable microstructures and properties characteristic of stainless steels. DOE

N83-32934# Oak Ridge National Lab., Tenn.
METHOD FOR ANODIC OXIDATION OF METALS AND THEIR ALLOYS
G. A. Markov, E. K. Shulepko, M. F. Zhukov, and B. I. Pischevitskii 7 May 1982 7 p refs Transl. into ENGLISH from Russian Patent No. 926084 (28 Mar. 1979)
(Contract W-7405-eng-26)
(DE83-007250; ORNL-TR-4956) Avail: NTIS HC A02/MF A01

A method was developed for anodizing metals and their alloys in a 0.5 to 5% sodium aluminate solution at a voltage of 100 to 1000 V. The process is conducted at a current density of 5 to 250 A/dm(2) with pulsed operation with a pulse duration of 0.001 to 0.1 s and with a pause of 0.02 to 0.1 s between pulses to intensify the process and increase the quality of the oxide film. Then 3 to 200 g/liter fine powder of metal or nonmetal carbide, nitride, or oxide powder, insoluble in the sodium aluminate solution, is added. DOE

N83-32935# Semikron Gesellschaft fuer Gleichrichterbau und Elektronik m.b.H., Nuremberg (West Germany).
NEW TECHNOLOGIES FOR METALLIZATION OF SEMICONDUCTOR DEVICES Final Report, Feb. 1982
Madan M. Chadda, Franz Scheffelmann, and Wolfgang Stoeger Bonn Bundesministerium fuer Forschung und Technologie Mar. 1983 59 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-035; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 12,50

Electroless metal deposition was investigated, especially for metal-semiconductor contacts. Methods of electroless deposition of aluminum, nickel, aluminum-nickel, tungsten alloy, and palladium contacts for semiconductor devices were developed. For each method the technology involved is explained and the properties of the contact are given. Author (ESA)

N83-32936# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany).
ION BEAM SPUTTER DEPOSITION OF THIN INSULATING LAYERS FOR APPLICATIONS IN HIGHLY LOADED CONTACTS
M. E. Koeniger, G. Reithmeier, and M. Simon (Technische Univ., Munich) 11 Feb. 1983 14 p refs
(MBB-UA-694/83-OE) Avail: NTIS HC A02/MF A01

Ion beam sputter deposition was used to deposit insulating layers of Al2O3 between 0.6 and 4 microns thick onto steel disks. The durability of the coated disks was tested in a twin disk machine under various working conditions. The insulating layers show good durability under conditions of high Hertzian pressure, high shear stress, and high temperature stress caused by high slip values. Due to their excellent mechanical properties the insulating layers are qualified as base layers for thin film transducers. Author (ESA)

N83-32937# Centro Informazioni Studi Esperienze, Milan (Italy). Documentation Service.
MICROMECHANISM OF ENVIRONMENTAL FATIGUE CRACK GROWTH IN A533B STEEL
G. Airoldi, C. A. Be, and T. Bruno 1983 10 p refs Presented at Intern. Conf. on Appl. of Fracture Mech. to Mater. and Struct., Freiburg, 20-24 Jun. 1983
(Contract ENEL-CISE-ISMAT-2F/003)
(CISE-2026) Avail: NTIS HC A02/MF A01

The number of MnS inclusions detected on the fracture surface of environmentally fatigued A533B specimens and on a metallographic plane parallel to the fracture surface are compared. Results do not support a model of a hydrogen-embrittling mechanism induced by MnS. Author (ESA)

N83-32938# Centre de Recherches Scientifiques et Techniques de l'Industrie des Fabrications Metalliques, Brussels (Belgium).
[ACTIVITIES IN METAL MANUFACTURING] Annual Report, 1982 [RAPPORT ANNUEL DU COMITE PERMANENT AU CONSEIL GENERAL]
15 Jun. 1983 42 p refs In FRENCH
Avail: NTIS HC A03/MF A01

Research in foundry technology, bridge building, boilermaking, welding, mechanical construction, industrial automation and computing, and transformation of plastics is summarized. High temperature materials, tank trucks, the use of robots, and the use of textile wastes to reinforce plastics are discussed. Author (ESA)

N83-32939# Centre de Recherches Scientifiques et Techniques de l'Industrie des Fabrications Metalliques, Brussels (Belgium). Section: Construction Metallique.
LOCAL UNIFORM HEAT TREATMENT AND ITS EFFECTS ON THE TOUGHNESS OF WELDED CMn PRESSURE VESSEL STEEL
W. Provost May 1983 25 p refs Sponsored by Inst. pour l'Encouragement de la Recherche Scientifique dans l'Industrie et l'Agriculture and IWONL Prepared in cooperation with Ghent Univ.
(CRIF-MT-154) Avail: NTIS HC A02/MF A01

The influence of a local postweld heat treatment on the toughness of welded joints in a C-Mn pressure vesse' steel was examined. The welded test plates, 50mm thick, were treated using electrical resistance heating over a width of 200mm. The influence of the treatment on the toughness of the welded joints was evaluated using wide plate test specimens. Results indicate that an improvement in toughness is obtained by the local heat treatment, resulting in toughness levels comparable to those

obtained by a furnace stress relief heat treatment. It is suggested that code requirements of local postweld heat treatment be modified so that application is not limited to circumferential welds.
Author (ESA)

N83-32712# Vereinigte Flugtechnische Werke G.m.b.H., Bremen (West Germany). Metallische Werkstoffe.
STATISTICAL AND VIBRATORY FATIGUE LIMIT CHARACTERISTICS OF ALUMINUM CAST ALLOYS [STATISCHE UND SCHWINGFESTIGKEITSKENNWERTE FUER ALGUSSLEGIERUNGEN]
H. Frommeyer *In its* Develop. and Demonstration of Econ. Production Systems in Airframe Construct. Sep. 1982 p 32-63 In GERMAN (For primary document see N83-32709 21-01)
Avail: NTIS HC A10/MF A01

N83-32713# Vereinigte Flugtechnische Werke G.m.b.H., Bremen (West Germany). Metallische Werkstoffe.
ADDITIONALLY COMPRESSED TITANIUM FINE CAST COMPONENTS [NACHVERDICHTETE TITAN-FEINGUSSTEILE]
K. Blomeier *In its* Develop. and Demonstration of Econ. Production Systems in Airframe Construct. Sep. 1982 p 64-83 In GERMAN (For primary document see N83-32709 21-01)
Avail: NTIS HC A10/MF A01

N83-32716# Vereinigte Flugtechnische Werke G.m.b.H., Bremen (West Germany). Metallische Werkstoffe.
SUPERPLASTIC TRANSFORMATION AND DIFFUSION WELDING OF TITANIUM ALLOYS [SUPERPLASTISCHES UNFORMEN/DIFFUSIONSSCHWEISSEN VON TILEGIERUNGEN]
W. Beck, K. F. Sahm, and P. J. Winkler *In its* Develop. and Demonstration of Econ. Production Systems in Airframe Construct. Sep. 1982 p 159-188 In GERMAN (For primary document see N83-32709 21-01)
Avail: NTIS HC A10/MF A01

N83-32737# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
MECHANISM OF STRESS CORROSION AND HYDROGEN INDUCED CRACKING
Zhu Wuyang, Li Shiqiong, Xiao Jimei, and Zhu Shuyan *In its* Acta Aeron. et Astronautica Sinica (FTD-ID(RS)T-0664-82) 4 Mar. 1983 p 196-214 refs Transl. into ENGLISH from Hang Kong Xuebao (China), v. 2, no. 1, 1981 19 p (For primary document see N83-32727 21-01)
Avail: NTIS HC A10/MF A01 CSCL 11/6

N83-33651# Nagoya Univ. (Japan). Dept. of Mechanical Engineering.
EFFECTS OF COMPLICATED DEFORMATION HISTORY ON INELASTIC DEFORMATION BEHAVIOUR OF METALS
Yoshio Ohashi *In* Nagoya Univ. Mem. of the Fac. of Eng., Nagoya Univ., Vol. 34, No. 1 May 1982 p 1-76 refs (For primary document see N83-33650 21-70)
Avail: NTIS HC A07/MF A01

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N83-32940 Defence Research Information Centre, Orpington (England).
PROCESSES OF DIELECTRIC AND NMR RELAXATION IN THE SURFACE LAYERS OF ACRYLATE-EPOXY-STYRENE COMPOUNDS
F. G. Fabulyak, Yu. S. Lipatov, V. M. Kuznetsova, and Z. N. Demidenko May 1983 14 p refs Transl. into ENGLISH of Vopr. Khimii i Khim. Tekhnol. (USSR), v. 32, 1974 p 3-13
(DRIC-T-6934; BR88059) Copyright. Avail: Issuing Activity

The molecular mobility of the polymer chains of acrylate-epoxy-styrene compounds, and changes of molecular mobility in the boundary layers on surfaces of silica flour and glass fiber were investigated to assess their effect on the properties of the filled materials. Effects of low-molecular impurities on the relaxation process in the surface layers were also investigated. For acrylate-epoxy-styrene compounds, rigidification of the polymer chains in the surface layer occurs on surfaces of various kinds. A low-molecular impurity capable of exerting a plasticizing effect shifts the relaxation processes to lower temperatures, partially or totally offsetting the effect of the substrate on molecular mobility. Studies of heat-treated filled systems show that with increasing chain rigidity the magnitude of the constraint exerted by a solid substrate on molecular mobility diminishes, i.e., the more rigid the macromolecules, the less they are rigidified by the surface of the filler.
Author (ESA)

N83-32941 National Physical Lab., Teddington (England). Div. of Materials Applications.
NPL POLYMERS AND COMPOSITES RESEARCH
F. J. Lockett May 1983 22 p refs
(NPL-DMA(A)-65; ISSN-0143-7313) Copyright. Avail: Issuing Activity

Organization, project management and industrial liaison of the NPL polymers and composite materials research group are outlined. Project areas include long term strength of GRP long term fracture of thermoplastics, the influence of processing on polymer structure and performance, and quality assessment of injection molded reinforced plastics. Other programs include characterization of rubber properties for antivibration mounts, materials selection for crash padding systems, and design of plastics panels. Test facilities are described. Author (ESA)

N83-32942*# General Electric Co., Schenectady, N. Y.
TOUGHENING MECHANISM IN ELASTOMETER-MODIFIED EPOXY RESINS: PART 1 Final Report, 23 Jun. 1980 - 31 Dec. 1981
A. F. Yee and R. A. Pearson Washington NASA Aug. 1983 130 p refs
(Contract NAS1-16132)
(NASA-CR-3718; NAS 1.26:3718; Rept-83-SRD-023-Pt-1) Avail: NTIS HC A09/MF A01 CSCL 11G

Several plaques of Epon 828, cured with piperidine, modified with hycar(r) CTBN 1300X8, Hycar(R) CTBN 1300X13, and Hycar(R) CTBN 1300x15, and in some cases modified with biphenol A (BPA), yielded properly toughened epoxies with rubber particle diameters ranging from 0.1 to 10 microns. Fracture toughness experiments indicate that toughness was more a function of rubber content than the rubber particle size. Tensile volumetric behavior of the near resin exhibits two regions: an initial region where the increase in volume strain was due to the Poisson's effect, and a second region where a slower rate of increase in volume strain was due to shear deformation. Tensile volumetric deformation of an elastomer-modified epoxy exhibits the same type of behavior to that of the neat resin at low rates ($< 3.2x0.01$ sec(-1)). But at very high strain rates, which correspond more closely to the strain rates at the crack tip, there exists an increase in volume strain beyond the Poisson's effect. TEM, SEM and OM studies indicate that the rubber particles had voided. When a thin section from the deformed region is viewed under crossed-polarized light, shear bands are seen connecting voided rubber particles. From this information cavitation and enhanced shear band formation is proposed as the toughening mechanism. Author

N83-32943*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
TRIBOLOGICAL MEASUREMENTS ON A CHARNLEY-TYPE ARTIFICIAL HIP JOINT
William R. Jones, Jr. Jul. 1983 30 p refs
(NASA-TM-83440; E-1501; NAS 1.15:83440) Avail: NTIS HC A03/MF A01 CSCL 11D

A total hip simulator was used to determine the friction and wear properties of Charnley-type (316L stainless steel balls and

sterile ultrahigh molecular weight polyethylene cups) hip prostheses. Three different sets of specimens were tested to 395,000, 101,500 and 233,000 walking cycles, respectively. All tests were run unlubricated, at ambient conditions (22 to 26 C, 30 to 50 percent relative humidity), at 30 walking cycles per minute, under a dynamic load simulating walking. Polyethylene cup wear rates ranged from 1.4 to 39 ten billions cu m which corresponds to dimensional losses of 4.0 to 11 microns per year. Although these wear rates are lower than those obtained from other hip simulators and from in vivo X-ray measurements, they are comparable when taking run-in and plastic deformation into account. Maximum tangential friction forces ranged from 93 to 129 N under variable load (267 to 3090 N range) and from 93 to 143 N under a static load of 3090 N. A portion of one test 250,000 walking cycles) run under dry air (< 1 percent relative humidity) yielded a wear rate almost 6 times greater than that obtained under wet air (< 70 percent relative humidity) conditions. Author

N83-32944# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SURVEY OF MECHANICS (SELECTED ARTICLES)
11 Apr. 1983 22 p refs Transl. into ENGLISH from Przeglad Mech. (Poland), v. 40, no. 15-16, Sep. 1981 p 32-34 and 40-43 (AD-A128249; FTD-ID(RS)T-0341-83) Avail: NTIS HC A02/MF A01 CSCL 11/9

The effect of heat treatment parameters on properties of plastics with particular emphasis on fatigue strength and polymerization molding of polyamide structural elements are discussed. For individual titles, see N83-32945 through N83-32946.

N83-32945# Air Force Systems Command, Wright-Patterson AFB, Ohio.
PLASTICS IN MACHINE BUILDING: EFFECT OF HEAT TREATMENT PARAMETERS ON PROPERTIES OF PLASTICS WITH PARTICULAR EMPHASIS ON FATIGUE STRENGTH
Jozef Koszkul *In its* Survey of Mech. (Selected Articles) 11 Apr. 1983 p 1-9 refs Transl. into ENGLISH from Przeglad Mech. (Poland), v. 40, no. 15-16, Sep. 1981 p 32-34 (For primary document see N83-32944 21-27)
Avail: NTIS HC A02/MF A01 CSCL 11/9

Characterization of selected structural plastics and the effect of temperature, aging, and heat treatment of plastics on change in their properties are considered. Author

N83-32946# Air Force Systems Command, Wright-Patterson AFB, Ohio.
POLYMERIZATION MOLDING OF POLYAMIDE STRUCTURAL ELEMENTS
Leszek Ciesielski *In its* Survey of Mech. (Selected Articles) 11 Apr. 1983 p 10-18 refs Transl. into ENGLISH from Przeglad Mech. (Poland), v. 40, no. 15-16, Sep. 1981 p 40-43 (For primary document see N83-32944 21-27)
Avail: NTIS HC A02/MF A01 CSCL 11/9

Anion Polymerization of Caprolactam, free casting, rotary casting, centrifugal casting, and possible applications are presented. Author

N83-32947# California Univ., Livermore. Lawrence Livermore Lab.
FIRST-ORDER CALCULATIONS FOR COATINGS
N. L. Thomas 29 Oct. 1982 8 p refs Presented at Opt. Soc. of Am. Workshop on Opt. Fabri. and Testing, Palo Alto, Calif., 13 Dec. 1982 Submitted for publication
(Contract W-7405-eng-48)
(DE83-002154; UCRL-88117; CONF-821208-1) Avail: NTIS HC A02/MF A01

Most experienced coating facilities have a collection of coating designs that were successfully coated in the past. These designs can be shifted in wavelength and corrected for dispersion, or shifted in design angle to satisfy different requirements. In many cases, a new design may be necessary to achieve the required goals. This paper attempts to cover some methods of first order coating designs that can later be optimized by trial and error, or with an optimization program. DOE

N83-32948# Oak Ridge National Lab., Tenn. Solid State Div.
DETAILED EXAMINATION OF TIME-RESOLVED PULSED RAMAN TEMPERATURE MEASUREMENTS OF LASER ANNEALED SILICON
G. E. Jellison, Jr., D. H. Lowndes, and R. F. Wood 1982 6 p refs Presented at the 6th Intern. Symp. on the Sci. Basis for Radioactive Waste Management, Boston, 1 Nov. 1982
(Contract W-7405-eng-26)
(DE83-003440; CONF-821107-28) Avail: NTIS HC A02/MF A01

Raman temperature measurements during pulsed laser annealing of Si are critically examined. It is shown that the Stokes to anti-Stokes ratio depends critically upon the optical properties of silicon as a function of temperature. These dependences, coupled with the large spatial and temporal temperature gradients normally found immediately after the high reflectivity phase, result in large variations in the calculated temperature depending upon the probe laser pulse width and the pulse-to-pulse and spatial variations in the annealing pulse energy density. DOE

N83-32949# Oak Ridge National Lab., Tenn. Metals and Ceramics Div.
MICROSTRUCTURE AND MECHANICAL PROPERTIES OF ION-IMPLANTED CERAMICS
C. S. Yust and C. J. McHargue 1982 14 p refs Presented at the Conf. on Emergent Process Methods for High Technol. Ceramics, Chapel Hill, N.C., 8 Nov. 1982
(Contract W-7405-eng-26)
(DE83-003487; CONF-821134-1) Avail: NTIS HC A02/MF A01

The effects of the direct implantation of cations into the lattice of alumina, silicon carbide, and titanium diboride have been studied. Alumina implanted with chromium, titanium, and zirconium ions remains crystalline and shows an increase in hardness and fracture toughness. Titanium diboride experiences similar trends. In contrast, silicon carbide becomes amorphous when implanted with chromium ions, becomes less hard, but shows an increased fracture toughness. The response to scratching and annealing is also discussed. DOE

N83-32950# Oak Ridge National Lab., Tenn.
STRUCTURE OF CERAMIC SURFACES MODIFIED BY ION-BEAM TECHNIQUES
C. J. McHargue, H. Naramoto, C. W. White, J. M. Williams, B. R. Appleton, P. S. Sklad, and P. Angelini 1982 13 p refs Presented at the Conf. on Ceramic Sci. - Emergent Process Methods for High Technol. Ceramics, Raleigh, N.C., 8 Nov. 1982
(Contract W-7405-eng-26)
(DE83-003484; CONF-821133-1) Avail: NTIS HC A02/MF A01

A wide variety of structures are produced by ion implantation in ceramics. Random (substitutional and interstitial site occupancy) solid solutions with concentrations of solute that exceed the solubility limit can be produced in Al_2O_3. The changes that occur during annealing are complex and sometimes unpredictable. Silicon carbide becomes amorphous in a manner analogous to Si for ion fluences that produce more than 0.2 dpa damage. Light (N) and heavy (Cr) ions produce similar results if the fluence is scaled to damage energy deposited. Because of mass differences in the ions, two damage regions are developed in TiB_2. The structure remains crystalline to very high damage levels. These structural alterations cause changes in the surface mechanical properties. Since virtually any chemical species can be implanted, one can independently control structural damage and chemical effects. When coupled with selective annealing, this technique has the potential for producing a wide range of surface structure and properties. DOE

N83-32951# California Univ., Livermore. Lawrence Livermore Lab.
CURING BEHAVIOR OF SEVEN SEGMENTED POLYURETHANE ADHESIVES
D. Mark Hoffman 1 Jun. 1982 19 p refs Presented at the

Natl. Meeting of the Am. Chem. Soc., Kansas City, Mo., 1 Sep. 1982
(Contract W-7405-eng-48)
(DE83-004287; UCRL-87546-Rev-1; CONF-820909-11-Rev-1) Avail: NTIS HC A02/MF A01

Investigation into the dynamic viscosity change on curing of seven segmented polyurethane polymers has shown that initial viscosities decrease with temperature while the rate of cure and change in viscosity depend directly on temperature. The polyurea hard segment systems cured more rapidly than polyurethane hard segment systems. For an as yet undetermined reason on definite evidence of gelation or vitrification was found in the dynamic mechanical measurements on these systems during cure even though the hard segment glass transitions for the polyurea systems are well above the cure temperature. All of these cured adhesives have low to intermediate moduli over a wide temperature range, bond rapidly and weld to most substrates, and are cured at room temperature or accelerated with heat in modestly dry environments. At cure temperature above 60 to 80 C some side reactions may occur reducing the properties of the cured adhesives. DOE

N83-32952# California Univ., Livermore. Lawrence Livermore Lab.
EXPLOSIVE CONSOLIDATION OF ALUMINUM NITRIDE CERAMIC POWDER: A CASE HISTORY
W. H. Gourdin, S. L. Weinland, C. J. Echer, and S. L. Huffsmith 1982 15 p refs Presented at the Conf. on Ceram. Sci. - Emergent Process. Methods for High Technol. Ceram., Raleigh, N.C., 8 Nov. 1982
(Contract W-7405-eng-48)
(DE83-003876; UCRL-88181; CONF-821133-2) Avail: NTIS HC A02/MF A01

A case study of the explosive consolidation of aluminum nitride (AlN) is presented. Measured and calculated stress histories show a two-wave structure during the initial compaction, consisting of an ingoing pulse and an outgoing pulse reflected from the cylinder axis. The macrostructural features of the consolidated specimen are rationalized and discussed in terms of this observed stress history. It is suggested that the second shock determines, at least in part, the final density of the compact. Examination of heat treated specimens in the transmission electron microscope (TEM) shows that recovery of the heavily dislocated microstructure is rapid at 1500 C, and, further, that the amorphous intergranular phase disappears. A dispersion of fine precipitates appears at grain boundaries during heat treatment as well. The fracture toughness of explosively consolidated specimens, is the same as that of hot pressed material, indicating that explosive consolidation is a viable means of producing dense, well bonded AlN. DOE

N83-32953# Argonne National Lab., Ill.
EXPERIMENTAL LABORATORY-SCALE BRITTLE FRACTURE STUDIES OF GLASSES AND CERAMICS Final Report
L. J. Jardine, W. J. Mecham, G. T. Reedy, and M. J. Steindler Oct. 1982 141 p refs
(Contract W-31-109-eng-38)
(DE83-005939; ANL-82-39) Avail: NTIS HC A07/MF A01

An experimental program was conducted to characterize the fragments generated when brittle glasses and ceramics are impacted. The direct application of the results is to radioactive waste forms for which the effects of accidental impacts must be known or predictable. Two major measurable experimental responses used for characterization of these effects are: (1) the size distribution of the fragments, including the sizes that are respirable; and (2) the increase in surface area of the brittle test specimen. This report describes the glass and ceramic materials characterized, the procedures and techniques used for the characterization of size distributions and surface areas, and the results of the two key responses of the impact tests. Five alternative methods of determining size distributions were compared. Also examined were the effects of diametral and axial specimen impact configurations and the use of mechanical stops to eliminate secondary crushing during testing. Microscopic characterizations of Pyrex and SRL 131 simulated waste glass and SYNROC fragments were also performed. DOE

N83-32954# California Univ., Livermore. Lawrence Livermore Lab.
MATERIAL PROPERTIES FOR TR-55 AND SILICONE ELASTOMERIC CUSHIONS
W. W. Feng, S. L. Albertson, and R. W. Rosinsky 5 Oct. 1982 17 p
(Contract W-7405-eng-48)
(DE83-008442; UCID-19727) Avail: NTIS HC A02/MF A01

The notation of finite elastic theory for compressible rubber like materials is introduced. The mechanics of data reduction, needed to determine the parameters of the theory, are displayed. The material properties of TR-55 rubber and silicone rubber cushions are obtained. The constitutive relation, with the material properties, correlates all uniaxial compressive data to a high degree of accuracy. The force deformation relations of thin sheets of TR-55 in compression were obtained. DOE

N83-32955# Bendix Corp., Kansas City, Mo.
METHODS FOR THE MEASUREMENT OF VOLATILES IN POLYMERS
Erich W. Grotheer and Clifford H. Smith 1983 12 p Presented at the Soc. of Plastics Engr. Ann. Tech. Conf., Chicago, 2-5 May 1983
(Contract DE-AC04-76DP-00613)
(DE83-002203; BDX-613-2871; CONF-830505-1) Avail: NTIS HC A02/MF A01

An apparatus was developed for the characterization of the volatile constituents of polymeric materials. The data generated can be used to predict the drying times and volatile concentrations and evolution rates after long term storage. The condensable and noncondensable volatiles also can be identified, which allows the prediction of compatibility problems when two materials are placed together. Generation of volatile component profiles as a part of material selection and decrease future compatibility problems. DOE

N83-32956# California Univ., Livermore. Lawrence Livermore Lab.
COMBUSTION SYNTHESIS OF TRANSITION-METAL NITRIDES
J. B. Holt and D. D. Kingman 14 Feb. 1983 13 p refs Presented at the Conf. on Ceramic Sci.: Emergent Process Methods for High Technol. Ceramics, Raleigh, N.C., 8-10 Nov. 1982
(Contract W-7405-eng-48)
(DE83-009120; UCRL-87794; CONF-8211133-4) Avail: NTiS HC A02/MF A01

A new process, using sodium azide (NaN3) as a solid source of nitrogen, for the production of transition metal nitride materials is presented. A -325 mesh Ti powder with average particle size of 22(SIGMA) was mixed with NaN3 powder in a glass jar on a vibratory mill for 5 minutes. The powder was cold pressed into cylinders or poured into quartz crucibles. The reaction product is a loose, friable powder that is easily removed from the quartz crucible. The average grain size of the TiN powder is 10(SIGMA). X-ray diffraction analysis verified the powder to be TiN with no trace of Ti metal. The advantages of this process are high purity products, high rates of synthesis, and energy efficient since no furnaces are required. DOE

N83-32957# Sandia Labs., Albuquerque, N. Mex.
RELATIONSHIPS BETWEEN THE SOL-TO-GEL AND GEL-TO-GLASS CONVERSIONS
C. J. Brinker and G. W. Scherer (Corning Glass Works, N.Y.) 1983 32 p refs Presented at the Intern. Conf. on Ultrastructure Processing of Ceramics, Glasses and Composites, Gainesville, Fla., 14 Feb. 1983
(Contract DE-AC04-76DP-00789)
(DE83-007032; SAND-83-1098C; CONF-830215-I) Avail: NTIS HC A03/MF A01

Multicomponent gels were prepared with a wide range of pH-water combinations so that the skeletal structure of the desiccated

gels varied from being less highly (low pH, low H2O) to more highly (high pH, high H2O) polymerized. The apparent value of isothermal viscosity, determined by isothermal shrinkage experiments, was found to increase with time, presumably due to polymerization and structural relaxation of the skeletal framework. This increase was dramatic (> 200 X) for less highly polymerized gels but was found to occur in all cases, and it therefore is predicted to be a general property of metal alkoxide-derived gels. DOE

N83-32958# Bendix Corp., Kansas City, Kans.
THERMOSET PRECURSOR
Yutzka Yamamoto (Sumitomo Electric Industries Ltd., Osaka, Japan) Apr. 1983 17 p Transl. into ENGLISH of Japanese Patent (Appl. No. 94,287 1979)
(Contract DE-AC04-76DP-00613)
(DE83-011131; BDX-613-2943) Avail: NTIS HC A02/MF A01

This invention pertains to a distinctive thermoset precursor which is prepared by mixing a resin composition (A) which can be hardened by ionizing radiation, and a resin composition (B) which can be hardened by heat but cannot be hardened by, or is resistant to, ionizing radiation, and by coating or impregnating a moiding or other substrate with a sheet or film of this mixture and irradiating this with an ionizing radiation. The principal components of composition (A) and (B) can be the following: (1) an acrylate or methacrylate and an epoxy resin and an epoxy hardener; (2) an unsaturated polyester resin and epoxy resin and an epoxy resin hardener; (3) a diacrylate or dimetharylate or polyethylene glycol and an epoxy resin; (4) an epoxy acrylates or epoxy methacrylate obtained by the addition reaction of epoxy resin and acrylic or methacrylic acid. DOE

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N83-32959 Prins Maurits Lab. TNO, Rijswijk (Netherlands).
INVESTIGATION INTO THE COMPATIBILITY OF EXPLOSIVES IN MUTUAL CONTACT AND/OR IN CONTACT WITH NON-EXPLOSIVES. REPORT 4B: COMPATIBILITY AND STABILITY OF PYROTECHNICAL MIXTURES USED IN PRYOTECHNICAL AMMUNITION. SURVEY OF THE COMPATIBILITY TESTING PROGRAM
H. J. Reitsma and R. Eerligh 1982 50 p refs
(Contract A70/KL/057)
(PML-1982-47; TDCK-77637) Copyright. Avail: Issuing Activity

Smoke, tear gas and incendiary grenades, red and white signal flares and firecrackers were aged for 4 to 12 weeks between - 54 and + 71 C under high relative humidity. The pyrotechnical mixtures were aged separately, in contact with construction materials and without contact, for 4 weeks at 90 C at low and high relative humidities. At the end of the storage period, functioning experiments on the ammunition were carried out, and the condition of the pyrotechnical mixtures was established by X-ray diffractometry and differential thermal analysis. There are failures of the ammunition after the aging experiments, mainly for physical reasons. The pyrotechnical mixtures appear to be very stable as long as no excessive amount of water vapor can enter.
Author (ESA)

N83-32960# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE PROCESS BY WHICH DOUBLE BASE PROPELLANTS WITH EMBEDDED CONTINUOUS WIRES ARE FABRICATED BY USE OF THE SCREW EXTRUDER
Yu Li Xie and Xi You Yang 8 Mar. 1983 14 p refs Transl. into ENGLISH from Kogyo Kayaku Kuokai Shi (Japan), v. 43, no. 1, Mar. 1982 p 15-21
(AD-A127723; FTD-ID(RS)T-1830-82) Avail: NTIS HC A02/MF A01 CSCL 21/9

A process by which the screw extruder is used to produce double base propellant grains embedded with continuous metal wires is described. By using the fabrication process developed during this research, it is not only possible to satisfy a full range of design requirements, but also to produce double base propellant grains with continuous wires that are embedded without distortion. These double base propellant grains with embedded continuous wires are capable of stable combustion in standard 50 mm diameter rocket motors. The experimental apparatus by which a screw extractor was used to produce the double base propellant grains with embedded continuous wires is described. The various factors which influence the quality of the propellant grains thus produced were also investigated. Additional topics studied include the construction of the propellant matrix, type and diameter of wire, choice of surface costing, and the method by which wire-embedded grains may be produced so as to satisfy the design demands of given rocket thrust requirements. R.J.F.

N83-32961# Tate and Lyle Technical Services Ltd., Coral Gables, Fla.
A REPORT ON THE ENGINEERING AND ECONOMICS OF AN ETHANOL/GASOHOL JOINT-VENTURE PROJECT WITH CALDWELL SUGARS CO-OP, INC. AT THIBODAUX, LOUISIANA. VOLUME 4: SUPPORTING DOCUMENTATION
Apr. 1982 126 p Prepared in cooperation with Independence Energy Co., Inc.
(Contract DE-FG07-81RA-50338)
(DE83-001200; DOE/RA-50338/1-Vol-4) Avail: NTIS HC A07/MF A01

Supporting documentation is given for a project for producing ethanol/gasohol at a Louisiana sugar factory. Areas covered include: project manpower and organization, the market for gasohol in Louisiana, socio-economic impact assessment, feasibility study approach, commercial viability, environmental, health, safety, and socio-economic assessments. DOE

N83-32962# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
MEMBRANE RESEARCH SUBTASK, ALCOHOL-FUELS PROGRAM. REPORT: FY 1982
P. Schissel Apr. 1983 46 p refs
(Contract DE-AC02-77CH-00178)
(DE83-010324) Avail: NTIS HC A03/MF A01

A first step toward the evaluation of membranes is to separate ethanol/water mixtures over a range of feed composition, temperature, and pressure. This has been accomplished for an initial set of commercially available membranes using reverse osmosis and pervaporation. Two membrane types (UOP, Inc. RC100 and FilmTec FT30) have performed well. Under reverse osmosis conditions the trends of product fluxes and separation factors are similar for the two types; however, FT30 is somewhat better in both categories. The flux and separation factors decrease rapidly as the wt % ethanol is increased, and water is always selectively permeated. Fluxes remain at an acceptable level over a wide concentration range; however, the separation factor becomes unacceptably low as the effects of osmotic pressure become predominant (15 to 30 wt % ethanol). This report discusses several methods that can overcome the limitations by osmotic pressure. Pervaporation apparatus was designed, fabricated, installed, and used to test the membrane set. DOE

N83-32963# Oak Ridge National Lab., Tenn.
COMPOSITIONAL CHANGES IN RED AND VIOLET SMOKE MIXES AFTER COMBUSTION
M. V. Buchanan, I. B. Rubin, and J. H. Moneyhun 1983 11 p refs Presented at the 7th Smoke/Obscurants Symp., Adelphi, Md., 26 Apr. 1983
(Contract W-7405-eng-26)
(DE83-011388; CONF-830459-1) Avail: NTIS HC A02/MF A01

As part of a program to investigate possible environmental and occupational risks of the colored smoke dyes in signal

grenades, two colored smoke mixes, red and violet, were studied both before and after detonation to evaluate any differences in composition due to the combustion process. The separation and identification of the components of the original and combusted red and violet smoke mixes are discussed. The conditions for the detonation of the smoke grenades and sampling of the combusted smoke mixes are also discussed. DOE

N83-32964# Air Products and Chemicals, Inc., Allentown, Pa.
LIQUID PHASE METHANOL PROCESS DEVELOPMENT UNIT: INSTALLATION, OPERATION, AND SUPPORT STUDIES Annual Technical Progress Report, 28 Sep. 1981 - 30 Sep. 1982
20 Oct. 1982 468 p refs Prepared in cooperation with Chem Systems, Inc., N.Y.
(Contract DE-AC22-81PC-30019)
(DE83-010228; DOE/PC-30019/T5; ATPR-4) Avail: NTIS HC A20/MF A01

The technical feasibility of indirect coal liquefaction using the Liquid Phase Methanol (LPMeOH) process is discussed. A unified design strategy was adopted to allow the Process Development Unit (PDU) to be capable either of liquid-fluidized or liquid-entrained operation. Heat and material balances were calculated for eight design cases. The final PDU design basis was established. A Design Hazards Review was conducted. The Texas Air Control Board granted an exemption from construction and operating permits. The data acquisition system and 80% of all equipment items required are on hand or in the procurement stage. Eighteen (18) items are being reused from the Chicago Liquid Phase Methanation Unit (LPM) or the Bruceton Synthoil Facility. Equipment being reused from the Chicago LPM unit was shipped to LaPorte. For the CSI Laboratory PDU modifications, the piping and instrumentation diagram equipment layout, and piping drawings were completed and major equipment was ordered. Testing of in situ catalyst reduction/activation was completed on the first commercial catalyst candidate. DOE

N83-32965# Silverstein (Calvin C.) Associates, Bethel Park, Pa.
ASSESSMENT OF THE OHZ HYDROGEN PROCESS Final Report
Calvin C. Silverstein Sep. 1982 86 p refs
(Contract DE-AC02-76CH-00016)
(DE83-011085; BNL-51651) Avail: NTIS HC A05/MF A01

The oxygen hydrogen zeolite (OHZ) process utilizes the strongly ionizing characteristics of cations exchanged into a crystalline zeolite lattice to catalytically decompose water in two distinct steps. These steps take place at two different temperatures in the same bed of zeolite particles. At the higher temperature, initially hydrated zeolite is dehydrated, and oxygen is generated from the remaining residual water. When the zeolite is cooled to a lower temperature and rehydrated, hydrogen remaining in the lattice from the high temperature step is released. The OHZ process is characterized by process simplicity, temperatures below 14000 F, the absence of corrosive chemicals, relative ease of product separation, and environmental acceptability. It is suggested that the OHZ process could require less development and have greater commercial potential than other developmental hydrogen processes. The purposes of the investigation are: (1) to survey the current state of knowledge on the OHZ hydrogen process and the cation exchanged zeolites which are used in the process; (2) to obtain preliminary data on process energy requirements; (3) to assess the commercial potential of the process through preliminary plant design studies; and (4) to identify process design and performance goals for commercial viability. DOE

N83-32966# Societe Nationale Industrielle Aerospatiale, Paris (France).
PERFECTIONING OF THROUGH BULKHEAD INITIATORS [MISE AU POINT D'INITIATEURS FONCTIONNANT PAR ONDE DE CHOC]
C. Mas, H. VaillantdeGuelis, L. R. Guy (Societe Nationale des Poudres et Explosifs), and R. Thivet (Societe Nationale des Poudres et Explosifs) 1982 16 p refs In FRENCH Presented at ADERA Colloq., Arcachon, France, Oct. 1982
(SNIAS-831-422-105) Avail: NTIS HC A02/MF A01

A hexogene through bulkhead initiator (TBI) was developed for launch vehicles, ballistic missiles, and spaceborne pyromechanical applications. The TBI consists of a detonation transmission element which contains the explosive charges, and an oxy-reducer compound which, initiated by the explosive charge, furnishes the necessary pressure and thermal energy. A 50 mg secondary charge is exploded, producing a maximum pressure of 40 bar, + or - 5, in a 22 cucm chamber, in < 5 msec. Over 700 cal are released. Author (ESA)

N83-32967# ESCOR, Inc., Northfield, Ill.
LANDFILL METHANE RECOVERY. PART 2: GAS CHARACTERIZATION Final Report, Dec. 1981 - Dec. 1982
George R. Lytwynyshyn, R. Eric Zimmerman, Norman W. Flynn, and Ronald Wingender Dec. 1982 146 p refs Sponsored in part by Gas Research Inst. Prepared in cooperation with Argonne National Lab.
(Contract W-31-109-eng-38)
(PB83-195420; GRI-81/0105-Pt-2) Avail: NTIS HC A07/MF A01 CSCL 21D

This study developed standardized landfill gas sampling and analytical procedures, and evaluated the feasibility of implementing the procedures at different laboratories. It developed a data base on the the amounts of volatile organic compounds and violatile mercury in raw, processed and surface landfill gas; and determined whether human pathogenic viruses and bacteria are present in the gas. Surface gas flux measurements were also made. Results from this project provide an information base for the landfill methane recovery industry from which an increased understanding and resolution of the environmental issues can be achieved. GRA

N83-32968# SRI International Corp., Menlo Park, Calif.
ELEMENTARY PROCESSES IN THE CATALYTIC COMBUSTION (MECHANISM, INTERMEDIATES AND CONTROLLING REACTIONS) Annual Report, Oct. 1981 - Sep. 1982
Henry Wise Dec. 1982 52 p refs Sponsored by Gas Research Inst.
(PB83-194944; GRI-81/0121; PYH-3671) Avail: NTIS HC A04/MF A01 CSCL 21D

The surface reactions involved in the catalytic oxidation of methane were examined on a molecular scale by Auger electron microscopy, and on a macroscopic scale by transient experiments. In platinum and nickel, oxygen adatoms are necessary to initiate the conversion of methane by hydrogen abstraction an iridium surface hydrogen abstraction occurs without the participation of oxygen adatoms. Nickel has two types of oxygen adspecie. The relative distribution is governed by the degree of surface coverage with oxygen. GRA

N83-32734# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
FUNDAMENTAL INVESTIGATION OF JET ENGINE IGNITION OF FUEL SPRAYS AND ITS APPLICATION
Chen Ningkun (Peking Inst. of Aeronautics and Astronautics) *In its* Acta Aeron. et Astronautica Sinica (FTD-ID(RS)T-0664-82) 4 Mar. 1983 p 134-148 refs Transl. into ENGLISH from Hang Kong Xuebao (China), v. 2, no. 1, 1981 15 p (For primary document see N83-32727 21-12)
Avail: NTIS HC A10/MF A01 CSCL 21/4

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N83-32969 Polish Academy of Sciences, Warsaw. Inst. of Fundamental Technological Research.
SCIENTIFIC ACTIVITIES OF THE POLISH ACADEMY OF SCIENCES: INSTITUTE OF FUNDAMENTAL TECHNOLOGICAL RESEARCH IN 1981

Zenon Mroz, ed., Julian Deputat, ed., Aleksandra Krolikowska, ed., and Kazimierz Sobczyk, ed. Panstwowe Wydawnictwo Naukowe 1983 148 p
(ISBN-83-01-04606-6; ISSN-0079-323X) Copyright. Avail: Issuing Activity

Structural mechanics, fluid mechanics, physical acoustics, ultrasonics, cybernetic acoustics, electromagnetic waves, energy problems, and nondestructive testing were the topics addressed. For individual titles, see N83-32970 through N83-32982.

N83-32970 Polish Academy of Sciences, Warsaw.
DEPARTMENT OF THEORY OF CONTINUOUS MEDIA **c39**
In its Sci. Activities of the Polish Acad. of Sci. 1983 p 7-12 (For primary document see N83-32969 21-31)
Avail: Issuing Activity

The main themes of interest in 1981 were: non-classical problems of elasticity and thermoelasticity, theory of discrete media and structural defects, foundations of the theory of continuous and discrete-continuous media and mechanics of fracture of solids. Author

N83-32971 Polish Academy of Sciences, Warsaw.
DEPARTMENT OF MECHANICS OF CONTINUOUS MEDIA AND DEPARTMENT OF STRUCTURAL MECHANICS
In its Sci. Activities of the Polish Acad. of Sci. 1983 p 13-43 (For primary document see N83-32969 21-31)
Avail: Issuing Activity

The topics of polymer physics, properties of harmonic waves in viscoelastic-fluids, crack formation, structural mechanics, inelastic deformations of metals, rocks, and soils subject to monotonous and variable loadings, creep properties, and brittleness were addressed. B.G.

N83-32972 Polish Academy of Sciences, Warsaw.
DEPARTMENT OF FLUID MECHANICS **c34**
In its Sci. Activities of the Polish Acad. of Sci. 1983 p 44-48 (For primary document see N83-32969 21-31)
Avail: Issuing Activity

Continuous optical discharge, the structure of shock waves, connected flows trough systems of bars arranged on a surface, and non-stationary subsonic flows around three dimensional obstacles were studied. Author

N83-32973 Polish Academy of Sciences, Warsaw.
SECTION OF THERMODYNAMIC FOUNDATIONS OF NEW METHODS FOR ENERGY CONVERSION **c77**
In its Sci. Activities of the Polish Acad. of Sci. 1983 p 55-61 (For primary document see N83-32969 21-31)
Avail: Issuing Activity

The topics of elastic and elastic-plastic behavior of porous material, design of vibro-insulators, equations for the coordinates of stress and strain rate tensors, use of solar energy, mathematical models for storage of thermal energy, and heat exchange were discussed. B.G.

N83-32974 Polish Academy of Sciences, Warsaw.
DEPARTMENT OF MECHANICAL SYSTEMS **c37**
In its Sci. Activities of the Polish Acad. of Sci. 1983 p 55-61 (For primary document see N83-32969 21-31)
Avail: Issuing Activity

Methods of modelling and investigation of the dynamic properties of mechanical systems and studies of the physical characteristics of the surface layer and the processes of its forming were pursued. Author

N83-32975 Polish Academy of Sciences, Warsaw.
DEPARTMENT OF ELECTROMAGNETIC WAVE THEORY **c32**
In its Sci. Activities of the Polish Acad. of Sci. 1983 p 62-65 (For primary document see N83-32969 21-31)
Avail: Issuing Activity

Current world trends in electromagnetic wave theory and usefulness for technological applications motivate the problems studied. The research field includes: diffraction, propagation and radiation of electromagnetic waves, nonlinear and dispersive waves in ionized media (plasma, magnetosphere). Author

N83-32976 Polish Academy of Sciences, Warsaw.
SECTION OF CONTINUUM ELECTRODYNAMICS **c33**
In its Sci. Activities of the Polish Acad. of Sci. 1983 p 66-68 (For primary document see N83-32969 21-31)
Avail: Issuing Activity

Different aspects of electromagnetic interactions with continuous media were studied. Determination of the stress intensity coefficients, as a function of the external electromagnetic field periodic in time and interacting with the dielectric were given. The influence of motion of the crack on the distribution of the electromagnetic field and mechanical stresses in the neighborhood of the crack tip was investigated. Author

N83-32977 Polish Academy of Sciences, Warsaw.
DEPARTMENT OF PHYSICAL ACOUSTICS **c71**
In its Sci. Activities of the Polish Acad. of Sci. 1983 p 69-79 (For primary document see N83-32969 21-31)
Avail: Issuing Activity

Experimental works were focused on studies of the properties of ceramic materials, metals, liquids and polymers by ultrasonic methods. Experimental investigations were also undertaken making use of the methods of photo and electroacoustic spectroscopy and acoustic resonance as well as acoustic emission and internal friction. Author

N83-32978 Polish Academy of Sciences, Warsaw.
DEPARTMENT OF ULTRASONICS **c71**
In its Sci. Activities of the Polish Acad. of Sci. 1983 p 80-87 (For primary document see N83-32969 21-31)
Avail: Issuing Activity

In 1981, the scientific effort was focused on a number of fundamental and applied problems in the field of ultrasonic physics and technology. Special attention was paid to the acoustic foundations of ultrasonic diagnostic methods, scientific research apparatus and measuring instrumentation. Author

N83-32979 Polish Academy of Sciences, Warsaw.
DEPARTMENT OF CYBERNETIC ACOUSTICS **c71**
In its Sci. Activities of the Polish Acad. of Sci. 1983 p 88-100 (For primary document see N83-32969 21-31)
Avail: Issuing Activity

The development of the theory, instrumentation and applications of methods and systems for the measurement, analysis, processing and synthesis of acoustic signals within the audio frequency range, particularly of the speech signal and the vibro-acoustic signal emitted by technical and industrial equipments treated as noise and vibration sources was discussed. The research work, both theoretical and experimental, aims at applications in various branches of science, and medicine, such as: acoustical diagnostics and phoniatric rehabilitation of pathological and postoperative states of the speech organ; bilateral "man-machine" speech communication based on the analysis, recognition and synthesis of the speech signal; vibro-acoustical diagnostics and continuous monitoring of the state of machines, technical equipments and technological processes. Author

N83-32980 Polish Academy of Sciences, Warsaw.
DEPARTMENT OF AEROACOUSTICS **c71**
In its Sci. Activities of the Polish Acad. of Sci. 1983 p 101-106 (For primary document see N83-32969 21-31)
Avail: Issuing Activity

Research conducted involved the following themes: the feedback in the process of generation of aerodynamic noise, sound propagation in bounded regions, nonlinear properties of mechano-acoustic resonance systems, and measurement and application of high power ultrasounds. Author

N83-32981 Polish Academy of Sciences, Warsaw.
DEPARTMENT OF ACOUSTOELECTRONICS **c71**
In its Sci. Activities of the Polish Acad. of Sci. 1983 p 107-117 (For primary document see N83-32969 21-31)

Avail: Issuing Activity

The generation and detection of monochromatic phonons of high frequency as well as the propagation of surface waves in heterogeneous media and on crooked surfaces were studied. Phenomena of reflexion, transmission and mode conversion of surface waves at a corner as well as the application of surface waves (proagating on frace surfaces) and bulk waves to estimations of properties, strength and structures of materials were also investigated. Author

N83-32982 Polish Academy of Sciences, Warsaw.
DEPARTMENT OF NON-DESTRUCTIVE TESTING c38
In its Sci. Activities of the Polish Acad. of Sci. 1983 p 118-121
(For primary document see N83-32969 21-31)
Avail: Issuing Activity

The analysis and translation of acoustic signals, analysis and applications of acoustic emission accompanying magnetic noise as well as examination of the physical state of a material by ultrasonic methods were studied. Author

N83-32983 ESDU International Ltd., London (England).
GUIDE TO THE USE OF DATA ITEMS IN THE DESIGN OF BONDED JOINTS
Jul. 1981 21 p refs Sponsored by the Royal Aeronautical Society
(ESDU-81022; ISBN-0-85679-349-3; ISSN-0141-4097) Avail: ESDU

This Data Item is an addition to the Structures Subseries. Guidance is provided for the use of the analytical procedures presented in similar data items as aids in the design of bonded joints. Examples of the adhesive material properties required for use with the data are given together with recommendations on how to obtain such properties. Attention is drawn to important factors affecting joint strength not covered by the analytical procedures and references are provided as a source of further information. Notes are also provided on the principal complementary or alternative methods currently available. B.W.

N83-32984 ESDU International Ltd., London (England).
THE STABILITY AND RESPONSE OF LINEAR SYSTEMS. PART 7: EXAMPLES
Sep. 1982 55 p
(ESDU-81040-Pt-6-Amend-A/B; ISBN-0-85679-373-6; ISSN-0141-3988) Avail: ESDU

This Data Item is an addition to the Dynamic Subseries. The various techniques available for the assessment of linear systems stability and response are illustrated by the use of worked examples. The data are typically applied to control system analysis, stability of surface and aerospace vehicles, servomechanisms, and vibration analysis. The range of data applicability includes any system that is described by linear differential equations with constant coefficients, such as many mechanical, electrical, chemical, biological, sociologial or other systems. ESDU

N83-32985 ESDU International Ltd., London (England).
STRUCTURAL MEMBERS: MEAN FLUID FORCES ON MEMBERS OF VARIOUS CROSS SECTIONS
Apr. 1982 34 p refs Supersedes ESDU-75011
(ESDU-82007; ESDU-75011; ISBN-85679-385-X; ISSN-0141-4003) Avail: ESDU

This Data Item is an addition to the Wind Engineering Subseries. Mean fluid force coefficients for structural members of various shapes for use particularly in the estimation of wind loading on rolled steel structural members are presented. The data cover equal and unequal leg angles, channels, H- or I- sections and compound angles over 360 degree range of incidence with allowance for yaw angles between 0 degrees and 90 degrees, for finite aspect ratio and shear flows. The effects of Reynolds number, turbulence, interference between nearby members and hysteresis in local flow patterns are discussed. ESDU

N83-32986 ESDU International Ltd., London (England).
NOTES ON THE DESIGN OF HELICAL COMPRESSION AND TENSION SPRINGS OF ROUND WIRE
Dec. 1982 20 p refs
(ESDU-83003; ISBN-0-85679-422-8; ISSN-0141-4089) Avail: ESDU

This Data Item is an addition to the Stress and Strength Subseries. A comprehensive guide to the concepts and principles relating to the design and operation of helical springs is presented. The prestressing process is described and the considerations governing choice of material, operational reliability, corrosion, temperature, electrical conductivity are discussed. Values of the operating temperature ranges of 27 spring materials are tabulated. The manner of loading is discussed with reference to cyclic, transverse, impact, and eccentric loading and buckling. Different designs of end forms for compression and tension springs are described with their effect on manufacturing costs and the free and solid lengths. Surface finish and treatment processes are examined. An optimum approach to design which minimizes either the weight, volume or closed length and an example calculation are described. The information required by the manufacturer is discussed. A specimen sheet is provided which tabulates the essential details required for manufacture. A number of alternative spring types are briefly described and a glossary of spring terminology is appended. ESDU

N83-32987 National Physical Lab., Teddington (England). Div. of Materials Applications.
DEVELOPMENT OF DESIGN ANALYSIS METHODS FOR NEW MATERIALS
F. J. Lockett May 1983 23 p refs
(NPL-DMA(A)-66; ISSN-0143-7313) Copyright. Avail: Issuing Activity

The use of design formulas, design charts, and computers for the design of polymer and composite parts in the automobile industry is discussed. Production and prototype applications demonstrate that plastics and composites are viable materials throughout the vehicle. The necessary level of design analysis depends on component criticality, and the level of optimization required. Although plastics and composites design require acceptance of advanced ideas or procedures, individual applications usually involve only one or two of these factors to a significant degree. Traditional design calculations for metals can be applied directly to plastics and composites, but this procedure has uncertain validity. Design calculation methods exist for most nontraditional aspects of plastics and composites behavior. Author (ESA)

N83-32988# Massachusetts Inst. of Tech., Cambridge. Energy Lab.
MARKET AND ECONOMIC ANALYSIS OF RESIDENTIAL PHOTOVOLTAIC SYSTEMS Final Report
R. D. Tabors Jun. 1982 43 p refs
(Contract DE-AC02-76ET-20279)
(DOE/ET-20279/216) Avail: NTIS HC A03/MF A01

The overall structure of a project to evaluate the U.S. residential photovoltaic market or markets is reviewed and experience obtained before cuts in federal funding for the project were reduced is summarized. Topics covered include residential worth analysis, (including retrofit applications); evaluation of presently available regional, econometric models which could be used to project housing stocks; and the analysis of retrofit potential for residential photovoltaic power systems given available roof area. A.R.H.

N83-32989*# Construction Technology Labs., Skokie, Ill.
EVALUATION OF DSS-14 PEDESTAL-REVIEW OF TOP SURFACE REPAIR PROCEDURES
R. G. Oesterle, D. W. Musser, and E. A. B. Salse May 1983 48 p refs Sponsored by NASA Prepared for JPL, Pasadena, Calif.
(Contract JPL-956493)
(NASA-CR-172974; JPL-9950-841; NAS 1.26:172974) Avail: NTIS HC A03/MF A01 CSCL 13B

Proposed repair procedures for the top surface of the pedestal supporting the hydrostatic bearing runner for the 64m Antenna

are presented. These procedures included: (1) removal of existing grout and concrete to approximately 8 in. below original concrete surface using a presplitting technique with expansive cement followed by secondary breaking; (2) preparation of exposed concrete surface including an epoxy bonding agent; and (3) replacement of material removed with 8 in. of new concrete surface including an epoxy bonding agent; and (4) replacement of material removed with 8 in. of new concrete and 4 in. of new grout. S.L.

N83-32990*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
DESIGN GUIDE FOR HIGH PRESSURE OXYGEN SYSTEMS
Aleck C. Bond, Henry O. Pohl, Normal H. Chaffee, Walter W. Guy, Charles S. Allton, Robert L. Johnston, Willard L. Castner, and Jack S. Stradling (White Sands Missile Range) Aug. 1983 83 p refs
(NASA-RP-1113; S-526; NAS 1.60:1113) Avail: NTIS HC A05/MF A01 CSCL 13I

A repository for critical and important detailed design data and information, hitherto unpublished, along with significant data on oxygen reactivity phenomena with metallic and nonmetallic materials in moderate to very high pressure environments is documented. This data and information provide a ready and easy to use reference for the guidance of designers of propulsion, power, and life support systems for use in space flight. The document is also applicable to designs for industrial and civilian uses of high pressure oxygen systems. The information presented herein are derived from data and design practices involving oxygen usage at pressures ranging from about 20 psia to 8000 psia equal with thermal conditions ranging from room temperatures up to 500 F. S.L.

N83-32991# California Univ., Livermore. Lawrence Livermore Lab.
HIGH-SPEED POLISHING OF GLASS LENSES
P. P. Hed 15 Oct. 1982 7 p refs Presented at Opt.. Soc. of Am. Workshop on Opt. Fabri., Palo Alto, Calif., 13 Dec. 1982 Submitted for publication
(Contract W-7405-eng-48)
(DE83-001189; UCRL-88268) Avail: NTIS HC A02/MF A01

High speed polishing is a polishing process which, unlike conventional polishing, requires neither tool adjustment during the polishing cycle nor frequent tool and machine stroke corrections. Such a process is very consistent. In order to achieve this consistency several conditions should be met: the lens blocker must run true, the curvature ground on the lens must be correct, the spindle speed, arm stroke, lap load and lap aperture must be maintained constant and tuned to each other and to the ground curve, the polishing slurry density, pH value and temperature must be controlled, etc. Now, no one expects to receive an absolute recipe considering there are so many variants, such as blocker size, lens size, lens radius, material and tolerances, etc. Many years of investigation are ahead of us. In the meantime, it is mandatory to run a pilot run for each job, in order to establish all the parameters before giving the production tools to the operator. DOE

N83-32992# Factory Mutual Research Corp., Norwood, Mass.
FIRE TESTS IN VENTILATED ROOMS EXTINGUISHMENT OF FIRE IN GROUPED CABLE TRAYS
J. P. Hill Dec. 1982 91 p refs
(EPRI Proj. 1165-1)
(DE83-901136; EPRI-NP-2660) Avail: NTIS HC A05/MF A01

The purpose of the work was to determine the required automatic sprinkler design density necessary to extinguish a developing fire in a grouped cable tray installation. Four preliminary tests and four extinguishment tests using PE/PVC cable were conducted within a specially designed, ventilated room. The results showed that an average design of approximately 0.20 mm/s (0.30 gpm/sq ft 2) discharged from automatic sprinklers with a 13-mm (1/2-in) orifice, 71 C (160 F) temperature rating and 3.05-m x 3.05-m (10-ft x 10-ft) spacing provided successful extinguishment for the specific grouped cable tray fires investigated. The results also provided data on a case where a developing fire in a grouped cable tray installation did not open any of the installed standard sensitivity sprinklers, suggesting another parameter (i.e., higher sensitivity sprinklers) in need of attention. DOE

N83-32993# Los Alamos Scientific Lab., N. Mex.
DESIGNING AND TESTING A HIGH-VELOCITY SELF-FORGING FRAGMENT
S. P. Marsh Oct. 1982 18 p
(Contract W-7405-eng-36)
(DE83-002920; LA-9538-MS) Avail: NTIS HC A02/MF A01

An explosive system was designed to propel a 215 g mild steel self forging fragment at a velocity of 6 km/s. The design was obtained using the hydrodynamic code PETRA. Flash radiography and penetration results are reported for experiments based on this design. DOE

N83-32994# Georgia Inst. of Tech., Atlanta. Coll. of Architecture.
INVESTIGATION OF PASSIVE COOLING TECHNIQUES FOR HOT-HUMID CLIMATES Final Report
James M. Akridge Oct. 1982 161 p refs Sponsored in part by the Georgia Power Co.
(Contract DE-AC02-79CS-30238)
(DE83-002865; DOE/CS-30238/1) Avail: NTIS HC A08/MF A01

Each feasible passive cooling technique and its application and limitation when applied to hot humid climates are described. The experimental and theoretical progress toward developing the Detached Earth Tempering concept as a viable passive cooling technique is detailed. The computer simulation, the experimental fields, and many refinements of the basic concept are discussed. DOE

N83-32995# Ecole des Hautes Commerciales, Liege (Belgium). Inst. Superieur de Commerce.
THE BELGIAN SPACE INDUSTRY: AN INDUSTRY FOR THE END OF THE CRISIS? Thesis [L'INDUSTRIE SPATIALE BELGE, UNE INDUSTRIE DE SORTIE DE CRISE?]
Veronique DHeur and Marcel Pirson (Space Information Center, Belgium) 1983 52 p refs In FRENCH
Avail: NTIS HC A04/MF A01

The history of the Belgian space industry, Belgian participation in ESA and other projects, and Belgian companies involved in space industries are reviewed. Cooperation in the development of ground systems for telecommunication and other satellites with Third World nations is seen as an area of important economic possibilities. Author (ESA)

N83-32996# Technische Hogeschool, Delft (Netherlands). Ship Hydromechanics Lab.
WIND PROPULSION OF MERCHANT SHIPS
J. Geritsma Oct. 1981 36 p refs Transl. into ENGLISH of "Windvoorsttuwing van Vrachtschepen" Rept-535, Oct. 1981 32 p Presented at Symp.: The Propulsion of the 1980's: Wind, Sun and Coal, Vissingen, the Netherlands, 15 Oct. 1981
(PB83-175489; Rept-535) Avail: NTIS HC A03/MF A01 CSCL 13J

The use of wind propulsion for merchant ships is discussed. Various sail configurations are discussed. Problems of wind velocity and direction are noted. It is concluded that sailing ships in the future must use a combination of sails and motors, that the operation of the sails be automated, and that the rigging must not adversely affect loading and unloading operations. GRA

N83-32997# Institute of Gas Technology, Chicago, Ill.
STUDY OF THE HYPERABSORPTION-CYCLE HEAT PUMPS Final Report, Dec. 1981 - Dec. 1982
Thomas S. Zawacki and Robert A. Macriss Mar. 1983 54 p refs
(PB83-194910; GRI-81/0129) Avail: NTIS HC A04/MF A01 CSCL 13A

The conventional absorption cycle has been commercialized for at least 30 to 40 years and has played a significant role in

current development of gas fired, absorption type heat pumps for residential applications. The major inherent limitation of the conventional absorption cycle is its relatively low coefficient of performance (COP) even under the best conditions. This report presents a preliminary assessment of a radically new cycle, termed the 'Hyperabsorption' cycle, which uses saturated salt solutions (three phases present). Literature data on fluid systems, cycle formulation and conceptualization and performance calculations are presented. GRA

N83-32998# Thermo Electron Corp., Waltham, Mass.
HIGH-EFFICIENCY, GAS-FIRED, HEAT-PIPE, WARM-AIR HEATING SYSTEM Annual Report, Jan. - Dec. 1982
F. E. Becker, A. Zakak, and E. F. Searight Jan. 1983 64 p
(PB83-194936; TE-4296-11-83; GRI-83/0005) Avail: NTIS HC A04/MF A01 CSCL 13A

Four residential heat pipe furnaces were installed at selected test sites early in 1982. Each furnace unit operated at 100,000 Btu/hr heat input with a steady state efficiency of 86 percent. Two of the units were life cycle tested in laboratories; no major difficulties were encountered during their operation. Two additional furnaces were tested in homes. Field test performance confirmed that a steady state efficiency of 86 percent and a seasonal efficiency of 82-83 percent were obtained. A major furnace manufacturer has been licensed to manufacture and sell the heat pipe furnace developed by Thermo Electron under GRI sponsorship. A manufacturing prototype furnace was designed and fabricated taking into consideration the production capabilities of the manufacturer. The furnace is rated at 105,000 Btu/hr heat input and has a steady state efficiency of 85 percent. A field test was begun to continue through the 1982-83 heating season. GRA

N83-32999# Texas A&M Univ., College Station.
EVALUATION OF ASPHALT-RUBBER MEMBRANE FIELD PERFORMANCE Interim Research Report, Sep. 1979 - May 1982
Scott Shuler, Bob M. Gallaway, and Jon A. Epps May 1982 235 p refs Sponsored in part by the Texas State Dept. of Highways and Public Transportation
(PB83-187732; TTI-2-9-80-287-2; FHWA/TX-81/51-287-2) Avail: NTIS HC A11/MF A01 CSCL 13B

This report presents a record of asphalt-rubber membrane field performance in Texas. An evaluation of performance is presented for forty-five separate projects in thirteen state highway districts. Approximately 850 lane miles of highways are represented by materials constructed as stress absorbing membranes (asphalt-rubber seal coats beneath asphalt concrete overlay). All projects reviewed were constructed between June, 1976 and September, 1981. Author (GRA)

N83-33000# Agbabian Associates, El Segundo, Calif.
BRIDGE RESPONSE TO TRAVELING SEISMIC WAVES Final Report, 15 Sep. 1980 - 31 Mar. 1883
B. D. Dendrou et al Mar. 1983 254 p
(Grant NSF CEE-80-07518)
(PB83-189357; AA-R-8113-5470) Avail: NTIS HC A12/MF A01 CSCL 13B

This report describes an advanced methodology (BASSIN), for analyzing traveling seismic wave effects on the dynamic response of an arbitrarily-configured, elastic bridge system (comprised of a road deck, piers, abutments, backfill, etc.). A substructuring approach has been used to formulate BASSIN; in this, the bridge system is represented using a three dimensional finite element model, and the underlying soil is depicted using a boundary element approach based on elastic half-space theory. Seismic excitations are induced by plane body waves or Raleigh waves with arbitrary direction of incidence, wavelength, and amplitude. BASSIN allows for a fully deformable interface between the bridge system and the underlying soil, and incorporates a special modal truncation procedure to account for higher mode response characteristics. Author (GRA)

N83-33001# Israel Aircraft Industries Ltd., Tel-Aviv. Engineering Div.
TWO AND THREE DIMENSIONAL SYSTEMS FOR COMPUTER AIDED GEOMETRIC DESIGN OF AIRCRAFT SURFACE AND COMPONENTS
F. Aryeh Jan. 1982 28 p refs
(PB83-187344; IAITIC-82-1010) Avail: NTIS HC A03/MF A01 CSCL 13C

Three interactive software systems dealing with the computerized definition, storage and handling of aircraft geometric shapes and entities in a multidisciplinary design environment are presented. The systems are operated in an interactive fashion via use of low cost graphic display terminals driven by a remote computer in a time sharing mode. GEODEF is a system for interactive definition of complex aircraft surfaces, GEOBASE is a system for interrogation and manipulation of a computerized aircraft geometry data base, and DOG is a 3-D detailed structural and mechanical part definition system. GRA

N83-33002# Washington Univ., Seattle. Dept. of Civil Engineering.
SULFUR EXTENDED ASPHALT PAVEMENT EVALUATION IN THE STATE OF WASHINGTON: EXECUTIVE SUMMARY OF SR270 HIGHWAY PAVEMENT PERFORMANCE
Joe P. Mahoney Nov. 1982 12 p refs
(Contract DOT-FH-11-9620)
(PB83-187526; FHWA-WA-RD-56.3A) Avail: NTIS HC A02/MF A01 CSCL 13C

This executive summary overviews the placement and performance of sulfur extended asphalt (SEA) paving mixtures at a highway test site (SR 270) near Pullman, Washington. This summary is the sixth and last report of this study. GRA

N83-33003# Purdue Univ., Lafayette, Ind. School of Civil Engineering.
STUDY OF CONCRETE FRAMED STRUCTURES DURING CONSTRUCTION
W. F. Chen and X. L. Liu Dec. 1982 25 p refs Presented at the ASCE Ann. Conv., New Orleans, 25-29 Oct. 1982
(Grant NSF CEE-81-04625)
(PB83-188136; CE-STR-82-41; NSF/CEE-82092) Avail: NTIS HC A02/MF A01 CSCL 13C

The development of a computer-based analytical model that simulates the concrete construction process for multistory reinforced concrete buildings is discussed. The basic relationships required to develop the model are the load deformation behavior of single post shores under biaxial loading and load-deformation-time behavior of the structural members. A biaxially loaded column model is developed to simulate the behavior of various types of single post shores. Available strength-stiffness-time relationships of concrete are used to determine the rate of strength and stiffness gain of the structural members in multistory buildings. The model is designed to analyze the relative distribution and interaction of loads between the structure and the falsework under static and dynamic loading conditions during construction. GRA

N83-33004# Technische Hogeschool, Delft (Netherlands). Dept. of Civil Engineering.
MUTUAL ACTION OF WALLS AND FRAMEWORKS IN HORIZONTAL STRESS
J. P. Straman and P. Sadi Mar. 1983 58 p Transl. into ENGLISH of the mono. "Samenwerking van Wanden en Raamwerken bij Horizontale Belasting" n.p., Oct. 1980 50 p
(PB83-175497; REPT-5-80-D3) Avail: NTIS HC A04/MF A01 CSCL 13M

Bearing structures of buildings must resist stresses both on the vertical and horizontal planes. Because of this deformations are caused in the structures, whereby in particular the horizontal displacements play a role, when stability problems can be anticipated. The vertical stresses, which impact upon the deformed structure, will actually increase the horizontal displacements. One of the major causes for the generation of horizontal displacements is the wind stress. The wind stress is transmitted

by the structure to the foundation in such a manner, that the total energy required for this is minimal. This means that the design elements of a structure in relation to its resistance to deformations play a role in the stress transmission and thereby provide a proportionate contribution to the stability of the entire structure. In this report a method is described to determine stress distribution in horizontally stressed bearing structures consisting of walls and frameworks. GRA

N83-33005# Michigan Univ., Ann Arbor. Dept. of Civil Engineering.
BEHAVIOR OF EXTERNAL REINFORCED CONCRETE BEAM TO COLUMN CONNECTIONS SUBJECTED TO EARTHQUAKE TYPE LOADING Ph.D. Thesis
Mohammad Reza Ehsani and James K. Wight Jul. 1982 267 p refs
(Grant NSF PFR-78-24556)
(PB83-188342; UMEE-82R5; NSF/CEE-82099) Avail: NTIS HC A12/MF A01 CSCL 13M

Twelve full-size exterior beam-to-column subassemblies were constructed and tested. The primary variables studied were: (1) ratio of the sum of the flexural strengths of the columns to that of the beam; (2) amount of transverse reinforcement placed within the joint; (3) shear stress in the joint; and (4) inclusion of transverse beams and slab for half of the specimens. In all bare specimens, diagonal cracks connecting the opposite corners of the joint were observed during the first cycle of loading. In specimens with transverse beam and slab, the flexural cracks formed when the slab reinforcement was in tension did not close completely with the reversal of the loading direction. Conclusions stress the importance of: (1) increasing both the flexural strength and transverse reinforcement ratios; (2) reducing joint shear stress; and (3) including transverse beams and slab. GRA

N83-33006# Michigan Univ., Ann Arbor. Dept. of Civil Engineering.
EXPERIMENTAL AND ANALYTICAL STUDY OF INTERNAL BEAM TO COLUMN CONNECTIONS SUBJECTED TO REVERSED CYCLIC LOADING Ph.D. Thesis
Ahmad Jan Durrani and James K. Wight Jul. 1982 298 p refs (Grant NSF PFR-78-24556)
(PB83-188359; UMEE-82R3; NSF/CEE-82097) Avail: NTIS HC A13/MF A01 CSCL 13M

Six full-sized interior beam-to-column subassemblages were tested under quasi-static loading which was intended to simulate earthquake input. Three variables were investigated: (1) percentage of transverse hoop reinforcement in the joint; (2) joint shear stress level; and (3) presence of transverse beams and slab on half of the specimens. It was concluded that the joint shear stress level was critical for the satisfactory performance of beam-to-column connections without transverse beams and slab. A joint performance index is proposed which integrates the effect of pertinent variables influencing the joint behavior. A hysteretic model for beam-to-column subassemblages is developed from the hysteretic behavior of the specimens tested. Author (GRA)

N83-33729# Politecnico di Torino (Italy). Ist. di Elettronica e Telecomunicazioni.
THE ORGANIZATION OF THE ITALIAN CALIBRATION SERVICE [ORGANIZZAZIONE DEL SERVIZIO ITALIANO DI TARATURA]
Claudio Egidi *In* Ist. Superiore di Sanita Refresher Course on Ionizing Radiation Metrology and Dosimetry, Pt. 1 4 Oct. 1982 20 p refs In ITALIAN (For primary document see N83-33722 21-72)
Avail: NTIS HC A11/MF A01

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N83-33007 British Broadcasting Corp., Kingswood (England). Engineering Div.
THE IMPROVED DISPLAY OF 625-LINE TELEVISION PICTURES
A. Roberts Jul. 1983 20 p refs
(BBC-RD-1983/8) Avail: British Broadcasting Corp., Kingswood Warren, Tadworth, Surrey, England

Conventional television, shown on the 625/50 standard with 2:1 interlacing of adjacent fields suffers several minor defects which become much more visible on large, bright displays. Large-area flicker and interline (interlace) twitter are easily seen, and line crawl, resulting from interlace, occassionally causes the picture to appear to be composed of only 312 1/2 lines. All these effects can be eliminated or reduced by displaying the received signal on a higher standard, such as 625/100 with 2:1 interlace or with sequential picture lines (1:1). The defects of 625/50, 2:1 displays and some of the ways in which they can be rendered less visible are described. Experimental monochrome results show that conversions to 625/100 with 2:1 interlace, 1250/100, 2:1 and 625/100, 1:1 all offer considerable prospects for improvement although the requirements of motion portrayal and vertical definition present conflicting requirements for the interpolation process. Less success was had with experiments using a 1250/100, 4:1 interlaced scanning structure, since it was found to be excessively prone to line crawl. Author

N83-33008 British Broadcasting Corp., London (England). Research Dept.
ENHANCED UK TELETEXT: EXPERIMENTAL EQUIPMENT FOR HIGH-QUALITY PICTURE CODING AND OTHER ENHANCEMENTS
J. L. Riley Jul. 1983 19 p refs
(BBC-RD-1983/7) Avail: BBC, Kingswood Warren, Tadworth, Surrey, Engl.

The construction of a pair of microcomputer-based units which will serve as a research tool in engineering teletext enhancements, one unit a transmitter and the other a receiver in a closed-circuit teletext transmission is described. The microcomputer system and frame store design is basically similar to that currently used by Logica in the Flair electronic graphics equipment. Considerable effort was devoted to the development of software handling. The units are equipped with a CP/M operating system, which is already widely known. This greatly simplifies the management of files and includes compiling routines and a software debugging tool. Software is being prepared in PASCAL. Routines were developed to receive, generate, edit and transmit teletext in its present form. Early attention was given to demonstrating that picture teletext is feasible through a crudely-coded slow-scan television system. An acceptable sampling structure for these pictures and optimizing the coding of data to fit in with a hierarchy of coding embracing other aspects of enhanced teletext, for example, geometric drawing, electronic painting and telesoftware are addressed. A high quality character font was incorporated to improve the display of text. Author

N83-33009 Royal Signals and Radar Establishment, Malvern (England).
AN INVESTIGATION INTO THE EFFECT OF SIDELOBE CANCELLATION UPON THE GENERAL SIDELOBE LEVEL
J. E. Summers and N. P. Wright Feb. 1983 45 p refs
(RSRE-Memo-3525; BR87981) Copyright. Avail: Issuing Activity

The effect of the antiphase signal, used to cancel sidelobe, on the remainder of the antenna radiation pattern and the associated radar or communication system was studied. Results show that sidelobe cancellation causes a significant raising of the

overall antenna sidelobe level. Sidelobes much greater than the auxiliary antenna radiation pattern are minimally affected; those of a similar level are raised by 3 dB; and those much less than the auxiliary aerial pattern are raised to its level. This last case causes serious sidelobe degradation and results in a significant raising of the far sidelobe level. Sidelobe degradation can be minimized, but not eliminated, by careful selection of the auxiliary pattern shape. As the phase structure tends to be random after the first few sidelobes, then power wise, i.e., incoherent, addition of main and auxiliary patterns can be employed for assessment. Author (ESA)

N83-33010*# Western Union Telegraph Co., McLean, Va.
PLANNING ASSISTANCE FOR THE 30/20 GHz PROGRAM, VOLUME 1 Final Report
G. Al-Kinani, M. Frankfort, D. Kaushal, R. Markham, C. Siperko, and M. Wall Sep. 1981 272 p refs 3 Vol.
(Contract NAS3-22461)
(NASA-CR-165484; NAS 1.26:165484; WUT-3413-10-Vol-1) Avail: NTIS HC A12/MF A01 CSCL 20N

Functional requirements for the 30/20 GHz communication system, planning assistance for the 30/20 GHz program, and a review of specified conceptual designs and recommendations are provided. N.W.

N83-33011*# Western Union Telegraph Co., McLean, Va.
PLANNING ASSISTANCE FOR THE 30/20 GHz PROGRAM, VOLUME 2 Final Report
G. Al-Kinani, M. Frankfort, D. Kaushal, R. Markham, C. Siperko, and M. Wall Sep. 1981 191 p 3 Vol.
(Contract NAS3-22461)
(NASA-CR-165484; NAS 1.26:165484; WUT-3413-10-Vol-2) Avail: NTIS HC A09/MF A01 CSCL 20N

In the baseline concept development the communications payload on Flight 1 was specified to consist of on-board trunking and emergency communications systems (ECS). On Flight 2 the communications payloads consisted of trunking and CPS on-board systems, the CPS capability replacing the Flight 1 ECS. No restriction was placed on the launch vehicle size. Constraints placed on multiple concept development effort were that launch vehicle size for Concept 1 was restricted to SUSS-D and for Concept 2 a SUSS-A. The design concept development was based on satisfying the baseline requirements set forth in the SOW for a single demonstration flight system. Key constraints on contractors were cost and launch vehicle size. Five major areas of new technology development were reviewed: (1) 30 GHz low noise receivers; (2) 20 GHz Power Amplifiers; (3) SS-TDMA switch; (4) Baseband Processor; (5) Multibeam Antennas. Author

N83-33012*# Western Union Telegraph Co., McLean, Va.
PLANNING ASSISTANCE FOR THE 30/20 GHz PROGRAM, VOLUME 3 Final Report
G. Al-Kinani, M. Frankfort, D. Kaushal, R. Markham, C. Siperko, and M. Wall Sep. 1981 63 p 3 Vol.
(Contract NAS3-22461)
(NASA-CR-165484; NAS 1.26:165484; WUT-3413-10-Vol-3) Avail: NTIS HC A04/MF A01 CSCL 20N

The three basic experiment categories and consolidated experiments proposed by members of the Carrier Working Group are defined by category and by carrier. The three experiment categories are: (1) Possible Service (PS); (2) Possible Service and Technology (PSAT); and (3) Possible Technology (PT). Under Task 9 Western Union provided review, recommendations and critique of the NASA generated Statement of Work (SOW) defining the technical requirements governing design, launch and operation of the 30/20 GHz experimental systems. Author

N83-33013# Communications Research Centre, Ottawa (Ontario). Radar and Communications Technology Branch.
MEASUREMENTS AND MODELLING OF THE HF RADIO NOISE ENVIRONMENT NEAR AN HVDC CONVERTER STATION
W. R. Lauber and J. M. Bertrand Mar. 1983 59 p refs
(CRC-1362) Avail: NTIS HC A04/MF A01

Measurements of the HF radio noise environment near an HVDC transmission line and converter station were made outside Winnipeg in July 1977. Typical levels and characteristics are presented for various combinations of mercury arc valve noise, AC hum and DC corona from a number of sites within eight kilometers of the converter station. In addition, two sets of measurements were taken 80 km from the converter station. Values of the root-mean-square, average and quasipeak voltages were calculated from the Amplitude Probability Distribution (APDs) of the noise and were found to compare favorably with the directly measured values. Four mathematical models, the Rayleigh and three others which were developed for atmospheric noise were fitted to the measured APD data. Using inputs of v sub rms and V sub d the Log-Normal model produced the most accurate predictions of the measured APDs. The Log-Normal and the Hall models both fitted the measured Average Crossing Rate data equally well. Author

N83-33014*# San Jose State Univ., Calif. Dept. of Chemistry.
CHARACTERIZATION AND DEGRADATION STUDIES ON SYNTHETIC POLYMERS FOR AEROSPACE APPLICATION Final Report, 1 Oct. 1981 - 10 Dec. 1982
Ming-ta Hsu 10 Dec. 1982 51 p refs
(Contract NCC2-28)
(NASA-CR-172996; NAS 1.26:172996) Avail: NTIS HC A04/MF A01 CSCL 20N

Characterization of FM9, polyisobutylene and their modified fuels is provided. Synthesis alternative AMA candidates was attempted. Some data for alternative AMA is shown. Author

N83-33015*# Illinois Univ., Urbana. Aeronomy Lab.
PHASE MODULATING THE URBANA RADAR
L. J. Herrington, Jr. and S. A. Bowhill 1 Mar. 1983 170 p refs
(Grant NsG-7506)
(NASA-CR-172993; NAS 1.26:172993; UILU-ENG-83-2501; AR-109) Avail: NTIS HC A08/MF A01 CSCL 17I

The design and operation of a switched phase modulation system for the Urbana Radar System are discussed. The system is implemented and demonstrated using a simple procedure. The radar system and circuits are described and analyzed. Author

N83-33016# Lincoln Lab., Mass. Inst. of Tech., Lexington.
MODE S BEACON SYSTEM: FUNCTIONAL DESCRIPTION
V. A. Orlando and P. R. Drouilhet 15 Jul. 1983 157 p refs
(Contracts F19628-80-C-0002; DOT-FA72WAI-261; FAA Proj. 052-241-04)
(ATC-42-Rev-C; FAA-PM-83-8-Rev-C) Avail: NTIS HC A08/MF A01

The Mode S Beacon System, a combined secondary surveillance radar (beacon) and ground-air-ground data link system capable of providing the aircraft surveillance and communications necessary to support ATC automation in traffic environments is described. Mode S is capable of common channel interoperation with the ATC beacon system, and may be implemented over an extended transition period. Mode S will provide the surveillance and communication performance required by ATC automation, the reliable communications needed to support data link services, and the capability of operating with a terminal or enroute, radar digitizer-equipped, ATC surveillance radar S.L.

N83-33017# European Space Agency, Paris (France).
JOINT ESA/COST-204 PHASED ARRAY WORKSHOP
A. Roederer, comp. and T. D. Guyenne, comp. Jun. 1983 69 p refs Workshop held at Noordwijk, Netherlands, 13 Jun. 1983
(ESA-SP-204) Avail: NTIS HC A04/MF A01; ESA, Paris FF 60

Phased array antennas used in communications satellites were discussed. Design; synthesis methods; contoured beams; L-band arrays for mobile service; limited scan arrays; and ship terminal phased arrays were considered. For individual titles, see N83-33018 through N83-33028.

N83-33018# Chalmers Univ. of Technology, Goteborg (Sweden).
SHIP TERMINAL PHASED ARRAY DEVELOPMENTS IN SWEDEN AND FINLAND

E. F. Bolinder and V. Santomaa (Technical Research Centre of Finland, Espoo) *In* ESA Joint ESA/COST-204 Phased Array Antenna Workshop Jun. 1983 p 1-8 refs (For primary document see N83-33017 21-32)
Avail: NTIS HC A04/MF A01; ESA, Paris FF 60

Laboratory models of phased aray antennas intended for ships were built. The Finnish antenna has five panels arranged on a cube; the Swedish one has two panels on top of each other, the upper one slanted. The Swedish antenna system moves on a vertical axis; all panels have 8 x 8 elements. The Finnish antenna has crossed dipoles, the Swedish one cavity backed circular slots. Phase shifters, switches, power dividers, diplexers and steering systems were built. Finland used a monopulse steering system, Sweden conical scan. Both antennas have 22 dB directivity and 20 dB gain. The Swedish antenna was successfully tested at sea. Author (ESA)

N83-33019# Centre National d'Etudes des Telecommunications, Lannion (France).
MICROSTRIP PATCH ARRAYS FOR SATELLITE COMMUNICATIONS
J. P. Daniel, A. vandeCapelle (Univ. Catholique de Louvain, Belgium), and J. Forrest (Univ. College, London) *In* ESA Joint ESA/COST-204 Phased Array Antenna Workshop Jun. 1983 p 9-14 refs (For primary document see N83-33017 21-32)
Avail: NTIS HC A04/MF A01; ESA, Paris FF 60

Procedures for the calculation of self and mutual impedance, in microstrip antennas using a transmission line model or a cavity model are compared. Experimental and theoretical results of mutual coupling are given for E and H plane. Measurements and computations were done on a two-elements array of rectangular patches (1 to 2 GHz band), and 2 elements of an 8 element linear array (20 GHz band). For mutual coupling between rectangular patches both theories are efficient particularly when spacing is large; for smaller distances the initial assumptions are no longer fulfilled and it is necessary to take into account all the slots, and the perturbation of the field distribution. In an array with more than two elements the computation of the surface (S) parameters shows fairly good agreement for S12, but a discrepancy for S1, j j<2. Author (ESA)

N83-33020# Technische Hogeschool, Delft (Netherlands).
COST 204 REVIEW OF LIMITED SCAN ARRAYS
L. P. Ligthart, K. P. Dombek (Fernmeldetechnisches Zentralamt), G. Doro (Selenia S.p.A.), and V. Santomaa (Technical Research Centre of Finland, Espoo) *In* ESA Joint ESA/COST-204 Phased Array Antenna Workshop Jun. 1983 p 15-19 ref (For primary document see N83-33017 21-32)
Avail: NTIS HC A04/MF A01; ESA, Paris FF 60

The use of multibeam limited scan reflector antennas for simultaneous reception from multiple satellites on geosynchronous orbits is discussed. The development of a 20/30 GHz multibeam antenna for European coverage from a wide band communication satellite is outlined. Feasibility studies indicate that electronically controlled limited scan antennas are a promising means of reducing multipath interference effects in radio links. Limited scan hybrid reflector array configurations to be used for multipath fading reduction are presented. Author (ESA)

N83-33021# European Space Technology Center, Noordwijk (Netherlands).
L-BAND ARRAYS FOR MOBILE COMMUNICATION SATELLITES
A. Roederer, A. Molker (Telefonaktiebolaget L.M. Ericsson, Molndal, Sweden), J. Forrest (Univ. College, London), and P. Sheehan *In* ESA Joint ESA/COST-204 Phased Array Antenna Workshop Jun. 1983 p 21-27 refs (For primary document see N83-33017 21-32)
Avail: NTIS HC A04/MF A01; ESA, Paris FF 60

Multibeam arrays of short backfire and of printed circuit patch radiating elements are described. Front end concepts using dual frequency short backfire elements and beam forming at 30 MHz were studied to provide multibeam Earth coverage, with limited complexity, enhanced reliability and low sidelobes for frequency reuse. Printed circuit patches, of lower gain than the short backfire elements, can be arranged in different size subarrays with different numbers of patches. This provides considerable flexibility in the control of the array aperture illumination while retaining the constraint of identical power amplifiers for the subarrays. This allows sidelobe levels suitable for considerable frequency reuse to be obtained. Author (ESA)

N83-33022# Rome Univ. (Italy). Dept. of Electronics.
APPLICATIONS OF MICROWAVE INTEGRATED CIRCUIT (MIC) RADIATORS TO LARGE ANTENNA ARRAYS
L. Vegni *In* ESA Joint ESA/COST-204 Phased Array Antenna Workshop Jun. 1983 p 29-36 refs (For primary document see N83-33017 21-32)
Avail: NTIS HC A04/MF A01; ESA, Paris FF 60

Design parameters concerning the scattering cross section of the MIC element in dual frequency antenna arrays, and mutual coupling when several MIC antennas are laid on the same substrate are considered. The full wave theory and antenna cavity theory (ACT) of MIC antennas are outlined. The ACT predictions of mutual coupling and scattering cross section were compared with measurements on linear arrays with a small number of elements, of which only one is fed, the others being attached to passive, matched loads. Results show that surface waves assume a relative importance when transversal or longitudinal cuts on the dielectric substrate, among the various elementary configurations of subarrays, are made. The presence of cuts in the substrate permits the reduction to lower levels of the mutual interactions, due to surface waves, among radiators. The effect of cuts is effective essentially in the E-plane measurements. It is possible to exclude any effect of surface waves on mutual coupling in the X-band. Author (ESA)

N83-33023# Radio Research Labs., Tokyo (Japan).
RECENT PHASED ARRAY WORK IN JAPAN
Tasuku Teshirogi and Naohisa Goto (Tokyo Inst. of Tech.) *In* ESA Joint ESA/COST-204 Phased Array Antenna Workshop Jun. 1983 p 37-44 refs (For primary document see N83-33017 21-32)
Avail: NTIS HC A04/MF A01; ESA, Paris FF 60

Phased array antennas for satellite communication, air navigation systems, radio astronomy, and remote sensing are discussed. The state of the art of phased array devices, such as phase shifters and active modules is reviewed. For satellite communication, an S band scanning single beam/fixed multibeam array, 30/20 GHz reflector-type multibeam antenna with array feed, and various array antennas for ground mobile terminals are described. For air navigation systems a design concept of cosecant beam with high aperture efficiency is introduced. A mm-wave five-element synthesis telescope, including technologies to maintain phase stability of the interferometer at 22/115 GHz, and middle and upper atmosphere radar are introduced. Author (ESA)

N83-33024# Bell Telephone Labs., Inc., Holmdel, N. J. Radio Research Lab.
PROGRESS ON THE USE OF PHASED ARRAYS IN COMMUNICATIONS SATELLITES
Douglas O. Reudink *In* ESA Joint ESA/COST-204 Phased Array Antenna Workshop Jun. 1983 p 45-48 refs (For primary document see N83-33017 21-32)
Avail: NTIS HC A04/MF A01; ESA, Paris FF 60

A concept which allows area coverage by a rapidly scanned spot-beam is discussed. The beam is steered so that all parts of the country are covered, but at different times. This works perfectly with a TDMA configuration. To achieve total service, it is necessary to move the beam at a rate such that it can pick up and drop traffic at different ground stations sequentially in time. The limited scan concept was applied to a model of U.S. traffic. A 7 transponder satellite was used with an overall efficiency of 92% and can readily accommodate growth. For the same model, a hybrid system consisting of 6 fixed spot beams plus 1 beam scannable anywhere within the continental U.S. was utilized with an efficiency of only 45%. Author (ESA)

N83-33025# Bell Telephone Labs., Inc., Holmdel, N. J.
SATELLITE ANTENNA DESIGNS UTILIZING PHASED ARRAYS
M. J. Gans *In* ESA Joint ESA/COST-204 Phased Array Antenna Workshop Jun. 1983 p 49-52 refs (For primary document see N83-33017 21-32)
Avail: NTIS HC A04/MF A01; ESA, Paris FF 60

Antenna designs using phased arrays were analyzed and tested for application to high capacity communications satellites operating at frequencies above 10 GHz. Results are described for scanning spot beam, scanning fan beam and multiple beam antennas which scan along adjacent strips. An Earth station antenna design which allows accurate tracking of the geosynchronous arc over 60 deg by a linear phased array is presented. By using reflectors to image phased arrays into large apertures, the advantages of phased arrays can be used for satellite communications without the difficulty of large array construction. Author (ESA)

N83-33026# Siemens A.G., Munich (West Germany).
BEAM SHAPING WITH PHASED ARRAY ANTENNAS BY CONTROLLING MERELY THE PHASE DISTRIBUTION
Walter A. Braeuner *In* ESA Joint ESA/COST-204 Phased Array Antenna Workshop Jun. 1983 p 53-56 refs (For primary document see N83-33017 21-32)
Avail: NTIS HC A04/MF A01; ESA, Paris FF 60

The principles of phase controlled beam shaping are demonstrated. An algorithm for computing the required phase across the aperture for given amplitude distribution and radiation pattern is developed. Examples of beam broadening and shaping are presented. It is shown that radiation patterns of any specified shape may be approximated by manipulating the phase on the aperture leaving the amplitude distribution undisturbed. Using the phase algorithm it is possible to construct shaped beams in order to improve the performance of a radar system. Author (ESA)

N83-33027# Universite Catholique de Louvain (Belgium). Microwaves Lab.
OPTIMAL SYNTHESIS METHODS FOR ARRAYS WITH PARTIALLY SPECIFIED PATTERNS
E. vanLil and A. vandeCapelle *In* ESA Joint ESA/COST-204 Phased Array Antenna Workshop Jun. 1983 p 57-61 refs Sponsored by National Fund for Scientific Research (For primary document see N83-33017 21-32)
Avail: NTIS HC A04/MF A01; ESA, Paris FF 60

A modification of the Tychonov regularization method for least squares algorithms, and a minimax criterion method for the synthesis of partially specified array patterns are discussed. Both were tested by synthesizing the vertical pattern of the microwave landing system. With both methods a pattern which satisfies all the design requirements is obtained. The numerical efficiency of the first method allows 10,000 equally spaced elements to be handled by minicomputers, while the second method is limited to 1000 elements. Author (ESA)

N83-33028# International Telecommunications Satellite Organization, Washington, D. C.
CONTOURED BEAM PHASED ARRAY ANTENNAS
P. Balling and W. Bornemann *In* ESA Joint ESA/COST-204 Phased Array Antenna Workshop Jun. 1983 p 63-66 refs (For primary document see N83-33017 21-32)
Avail: NTIS HC A04/MF A01; ESA, Paris FF 60

The performance of phased array antenna systems optimized to provide several frequency reuses with high sidelobe and cross polarization isolation for INTELSAT satellites was analyzed. The data were calculated by multiplying the array factor of the configuration with an array element pattern. Results suggest that the required sidelobe isolation is difficult to meet. One way to overcome these difficulties is to increase the radiating aperture and/or the number of elements, but due to limitations in spacecraft technology, this is not practicable. The use of subarray techniques to provide a better tailored element pattern may be feasible. Author (ESA)

N83-33029# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
DEVELOPMENT OF A VOICE FUNNEL SYSTEM Quarterly Technical Report, 1 Nov. 1982 - 31 Jan. 1983
R. D. Rettberg Apr. 1983 41 p
(Contract MDA903-78-C-0356; ARPA Order 3653)
(AD-A128363; BBN-5285; QTR-18) Avail: NTIS HC A03/MF A01 CSCL 17/2

This Quarterly Technical Report covers work performed during the period noted on the development of a high-speed interface, called a Voice Funnel, between digitized speech streams and a packet-switching communications network. Author (GRA)

N83-33030# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
INTRODUCTION TO THE ZFW-2/ZSW-2 CHARACTER FACSIMILE MACHINE
18 Mar. 1983 7 p Transl. into ENGLISH of Enclosure no. 1 to rept. 1-572-0041-82 (China) p 1-4
(AD-A128052; FTD-ID(RS)T-1443-82) Avail: NTIS HC A02/MF A01 CSCL 17/2

Functions and characteristics are described or a facsimile machine which employs the flat scanning methods and is used to transmit single color written material, charts, or documents. Only three minutes is required to transmit a 16-page message text over a 0.3 to approximately 3.4 kHz wire carrier channel or public communication network. Specifications are given for the transmitter and receiver and directions for installation are included. A.R.H.

N83-33031# Los Alamos Scientific Lab., N. Mex.
COMPUTER-CONTROLLED DATA COMMUNICATIONS TEST CENTER
Robert R. Horning, Larry R. Creel, and Margaret A. Doll 1982 6 p Presented at the Fall DECUS US Symp., Anaheim, Calif., 6-9 Dec. 1982
(Contract W-7405-eng-36)
(DE83-003539; LA-UR-82-3322; CONF-821201-8) Avail: NTIS HC A02/MF A01

The software which was developed for a computer based test center used in testing and diagnosing a large network of terminal and remote processor communications links is described. The software runs in time base scheduled and on demand interactive modes. It includes a control program, several measurement tasks, Datatrieve-11 databases, and various graphical display programs, all running under RSX11M, V4.0, on a PDP-11/70. DOE

N83-33032# California Univ., Livermore. Lawrence Livermore Lab.
IDENTIFICATION OF ANTENNA PARAMETERS FROM TIME-DOMAIN PULSE-RESPONSE DATA
G. A. Clark, L. C. Martin, and E. J. Bogdan Apr. 1983 183 p refs
(Contract W-7405-eng-48)
(DE83-008896; UCID-19770) Avail: NTIS HC A09/MF A01

The important and difficult problem of identifying antenna parameters from transient electromagnetic data were analyzed. The identification problem is defined and shown to be difficult for the transient case. Several identification schemes are discussed and examples of results are given. The most promising technique for transient identification appears to be one using a linear pole zero model that is estimated iteratively using the entire data record pair at each iteraction. It is shown that the calculated impedance and effective height values agree with theory. It is emphasized that before identification can be carried out, the measurement data should be sampled properly, and that proper preprocessing is done. DOE

N83-33033# Wisconsin Univ., Madison. Dept. of Electrical and Computer Engineering.
PERFORMANCE OF AN ARRAY OF VERTICAL DIPOLES OVER AN INHOMOGENEOUS GROUND SYSTEM
Ray J. King (Illinois Univ., Chicago) and N. C. Mathur (LLL) Livermore, Calif. LLL Mar. 1983 29 p refs Presented at the IEEE/APS Symp., Houston, Tex., 23-26 May 1983

(Contract W-7405-eng-48)
(DE83-012097; UCRI-88555; CONF-830512-2) Avail: NTIS HC A03/MF A01

Radiation patterns of a stacked array of vertical electric dipoles (VEDs) over several different azimuthally symmetric inhomogeneous ground systems were evaluated. As the ground influences the pattern of each VED differently, there is no known optimum array excitation which can be used to achieve desired beam shaping and steering. Patterns in an array of 21 VEDs spaced 0.1 lambda apart are computed and compared to RF (10 MHz) for three excitation functions: (1) conventional linear special phasing; (2) phasing according to the complex conjugate of the field produced by each VED in the direction of steering; and (3) spacially sinusoidal excitation with constant phasing. Grounds consisting of homogeneous earth, a perfectly conducting ground plane, a perfectly conducting disk on homogeneous earth and two lambda long radial wire ground systems on well and poorly conducting earth were examined. It is found that the radiation pattern cannot be steered below about 90 in elevation for any of the excitation functions or the ground systems used. For low angle steering conjugate excitation produces a slightly narrower beam with smaller sidelobes. Highly conducting grounds tend to permit steering to slightly higher elevations with narrower beams. DOE

N83-33034# Laboratory for Electronic Development of the Armed Forces, Oegstgeest (Netherlands).
COMMENTS ON A PATENTED SOLUTION OF MULTIPATH PROPAGATION EFFECTS
J. C. A. vanGessel 1 Nov. 1982 28 p refs Partly in ENGLISH and DUTCH
(Contract A80/KM/065)
(LEOK-TR-1982-08; TDCK-77254) Avail: NTIS HC A03/MF A01

Two patents concerning a signal processing method for correcting multipath propagation effects in monopulse tracking radars are discussed. An extra elevation bundle is used to obtain the information required for signal processing. The mathematical analysis passes over a number of inherent weak points. The extra elevation channel only gives antenna diagram information at high signal to noise ratios. The signal processing method is not always reliable during a radar track. It is only applicable for specular reflection and not for diffuse reflection. For small angular differences between direct path and multipath, the signal to noise ratio has to be large, which poses problems for small targets at relatively large distances. Author (ESA)

N83-33035# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Afd. Technische Menskunde.
OPERATIONAL LIGHTING AT THE AIR TRAFFIC CONTROL CENTER (MILATCC) AT NEW-MILLIGEN
E. Ellens and H. J. Leebeek Oct. 1982 22 p In DUTCH; ENGLISH summary
(Contract A73/KLu/096)
(IZF-1982-28; TDCK-77222) Avail: NTIS HC A02/MF A01

An operational lighting system for radar consoles is outlined. It is based on low voltage slit luminaires and is suitable for cases where certain parts of the console have to be specifically lighted without disturbing the radar information. A modified design was investigated, but it is found that the improvements do not justify the costs and that the existing system is adequate, given a few modifications. Author (ESA)

N83-33036# Graz Univ. (Austria). Inst. fuer Nachrichtentechnik und Wellenausbreitung.
VLF WAVE PROPAGATION AND DETERMINATION OF IONOSPHERIC PARAMETERS [VLF-WELLENAUSBREITUNG UND BESTIMMUNG VON IONOSPHAERENPARAMETERN]
E. Floery and W. Riedler Jun. 1982 57 p refs In GERMAN
(INW-8202) Avail: NTIS HC A04/MF A01

Characteristics and composition of the ionosphere were theoretically investigated by VLF wave propagation in the Earth-ionosphere waveguide. The exact mode equation is deduced and the calculation of the waveguide parameters v/c and alpha is explained. The ionospheric plasma parameters are determined by numerical simulation. Comparison of these calculations with the results of earlier VLF measurements and results from the literature shows good agreement. Author (ESA)

N83-33037# Graz Univ. (Austria). Inst. fuer Nachrichtechnik und Wellenausbreitung.
MODE CALCULATION FOR A CURVED WAVEGUIDE [MODENBERECHNUNG FUER EINEN GERKRUEMMTEN WELLENLEITER]
E. Floery and E. Graif Apr. 1982 54 p refs In GERMAN; ENGLISH summary
(INW-8203) Avail: NTIS HC A04/MF A01

A method using a start-point table is developed to calculate the exact mode equation in a curved anisotropic waveguide. This version needs a minimum of central processing unit time and computes all relevant modes with increasing phase velocity and attenuation. In a numerical iteration procedure complex boundary values take into account the real ground and the highly inhomogeneous ionospheric conditions in the Earth-ionosphere waveguide. Author (ESA)

N83-33038# Graz Univ. (Austria). Inst. fuer Nachrichtechnik und Wellenausbreitung.
ERROR HANDLING TECHNIQUES BASED ON CHANNEL CODING, FOR SATELLITE COMMUNICATION SYSTEMS [TECHNIKEN DER FEHLERBEHANDLUNG BEI SATELLITEN-UEBERTRAGUNGSSYSTEMEN AUF DER BASIS VON KANALKODIERUNG]
M. Otter May 1982 144 p refs In GERMAN; ENGLISH summary
(INW-8204) Avail: NTIS HC A07/MF A01

Channel coding schemes which can be applied for error control on satellite communication links were investigated. Characteristics and performance of coding techniques are investigated, with respect to error probabilities, complexity, data rates, and necessary bandwidth. To enable a performance comparison of different codes, an approximation for the bit error probability of block codes was derived, with the advantage that codes with different parameters can be treated equally. In many cases more accurate results can be obtained. An error rate reduction computation method is presented. Representative coding curves are evaluated. Optimum applications of error control techniques in various transmission systems are presented. It is shown that techniques exist for almost any kind of transmission channel, which achieve significant improvements in the system performance, even for very different channel parameters. Author (ESA)

N83-33039# Fondazione Ugo Bordoni, Rome (Italy).
CRITERIA OF VOICE CHARACTERIZATION FOR SPEAKER RECOGNITION [CRITERI PER LA CARATTERIZZAZIONE DI UNE VOCE AI FINI DEL RICONOSCIMENTO DEL PARLANTE]
Antonio Federico, Giovanni Ibba, and Andrea Paolini Oct. 1982 26 p refs In ITALIAN
(FUB-29-1982) Avail: NTIS HC A03/MF A01

A statistical model of voice recognition is studied. A covariance matrix of voice parameters was computed using data from 4 speakess, 20 samples and 28 parameters. Mahalanobis generalized distances were calculated using the covariance matrix. Each speaker is characterized by an average multidimensional vector. The maximum likelihood principle is applied to identify an unknown speaker by using the chi square test. The computed matrix data and individual voice parameters are presented. Author (ESA)

N83-33040# Fondazione Ugo Bordoni, Rome (Italy).
UNIFIED INTERFACE FOR THE INTERCONNECTION BETWEEN STRATIFIED ARCHITECTURE LEVELS IN COMMUNICATION PROCESSES [INTERFACCIA UNIFICATA DI INTERCONNESSIONE TRA I LIVELLI DELLA ARCHITETTURA STRATIFICATA PER I PROCESSI DI COMUNICAZIONE]
Marco Listanti, Claudio Rossi, Paolo Talone, and Francesco Villani Dec. 1982 38 p refs In ITALIAN
(FUB-36-1982) Avail: NTIS HC A03/MF A01

The structure of interconnections between adjacent levels of

open systems architecture is redefined in order to obtain a common structure for all interfaces, consenting the exchange of structured information (interface primitives) of either request, indication, response or confirmation type. The resulting structure is a rationalization of the service primitives defined in the ISO and ECMA standards. One of the consequences of the study is the redifinition of the levels one and two. Author (ESA)

N83-33041# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. Systemes et Communications.
SIMULATION ANALYSIS OF THE INFLUENCE OF AMPLITUDE DISTORTION DUE TO MULTIPATH TRANSMISSION OF THE QUALITY OF DIGITAL HERTZIAN BEAMS Ph.D. Thesis [ANALYSE PAR SIMULATION DE L'INFLUENCE DE LA DISTORTION D'AMPLITUDE DUE AUX TRAJETS MULTIPLES SUR LA QUALITE DES FAISCEAUX HERTZIENS NUMERIQUES]
Mohammed Sadiqi 23 Mar. 1983 139 p refs In FRENCH
(ENST-E-83002) Avail: NTIS HC A07/MF A01

A method for calculating the time of breaks in a digital Hertzian link during selective fading is presented. The method is based on a three beam propagation model. Analysis shows that Rummler's propagation model accounts satisfactorily for selective fading phenomena. Break times are much higher than those given by the CCIR model. Beyond a certain point, the quality of the link can not be improved by increasing output power. At constant digital output, 4 PSK modulation is recommended. Author (ESA)

N83-33042# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France).
SIMULATION OF THE INTERACTION OF AN ELECTROMAGNETIC PULSE WITH A CYLINDRICAL STRUCTURE BY A CURRENT INJECTION TECHNIQUE [SIMULATION DE L'INTERACTION DE L'I.E.M. AVEC UNE STRUCTURE CYLINDRIQUE PAR UNE TECHNIQUE D'INJECTION DE COURANT]
M. Perey 1983 5 p refs In FRENCH Presented at Tregastel Conf., Jun. 1983
(SNIAS-831-430-101) Avail: NTIS HC A02/MF A01

A test method which creates a current on a cylinder similar to that produced by coupling with an electromagnetic pulse is outlined. Condensers are discharged at the ends of a cylinder placed above a mass plane. Modeling, based on line theory, enables optimum coupling configurations for generators to be determined, and surface currents at different points to be calculated. A method for analyzing surface currents, which decomposes the signal into a sum of sinusoids representing the resonance frequencies of the structure, is presented. Tests show that the method can be used to test assemblies which have cabling. It gives results comparable to strip line tests, but is much simpler. Author (ESA)

N83-33043# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France).
INDUSTRIAL ELECTROMAGNETIC CHECKOUT OF ARMORED WIRING [CONTROLE ELECTROMAGNETIQUE A CARACTERE INDUSTRIEL DE CABLAGES BLINDES]
J. Ferre 1983 4 p In FRENCH Presented at Tregastel Conf., Jun. 1983
(SNIAS-831-430-102) Avail: NTIS HC A02/MF A01

A method for testing whether armored wiring can withstand EMP's caused by nuclear explosions is described. The wires are checked in their production cases, using a strip line antenna as pulse source. Only one measurement per connector is made, with the connector conductors in parallel. The method is quick, repeatable, and does not damage the wiring. Author (ESA)

N83-32736# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
MONOPULSE TECHNIQUE IN AIRBORNE RADAR
Ji Jie (Airborne Radar Inst.) *In its* Acta Aeron. et Astronautica Sinica (FTD-ID(RS)T-0664-82) 4 Mar. 1983 p 174-195 refs Transl. into ENGLISH from Hang Kong Xuebao (China), v. 2, no. 1, 1981 22 p (For primary document see N83-32727 21-01)
Avail: NTIS HC A10/MF A01 CSCL 17/5

N83-32975 Polish Academy of Sciences, Warsaw.
DEPARTMENT OF ELECTROMAGNETIC WAVE THEORY
In its Sci. Activities of the Polish Acad. of Sci. 1983 p 62-65 (For primary document see N83-32969 21-31)
Avail: Issuing Activity

N83-33279# Nagoya Univ. (Japan).
NEW RECEIVER AND CONTROL SYSTEM FOR 10-m DIAMETER ANTENNA
Katsumi Tsukamoto, Chikayoshi Torii, and Shinzo Enome *In* Nagoya Univ. Proc. of the Res. Inst. of Atmospherics, Nagoya Univ., Vol. 30 Mar. 1983 p 49-60 refs (For primary document see N83-33274 21-42)
Avail: NTIS HC A06/MF A01

N83-33292# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
CALIBRATION OF DOPPLER RECEIVERS [KALIBRIERUNG VON DOPPLEREMPFAENGERN]
Wolfgang Schlueter and Peter Pesec *In its* The German-Austrian Doppler Campaign 1982 55-60 ref In GERMAN (For primary document see N83-33288 21-43)
Avail: NTIS HC A07/MF A01

N83-33446# EISCAT Scientific Association, Kiruna (Sweden).
THE POTENTIAL USE OF THE EISCAT AND SONDRESTROMFJORD RADARS IN SUPPORT OF ROCKET AND BALLOON MEASUREMENTS
Murray Baron and Juergen Roettger *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 299-306 refs (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

N83-33491# Meteorological Satellite Center, Tokyo (Japan).
ON THE MODIFICATION OF COMPUTER PROGRAMS FOR THE IMPROVEMENT OF LOW RESOLUTION FACSIMILE DISSEMINATION
Hiroshi Fujimura *In its* Meteorol. Satellite Center Tech. Note, No. 7, 1983 Mar. 1983 p 59-72 In JAPANESE; ENGLISH summary (For primary document see N83-33485 21-47)
Avail: NTIS HC A06/MF A01

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics.*

N83-33044 Plessey Co. Ltd., Romsey (England). Electronic Systems Research Div.
PHASE-LOCK CONTROL OF MICROWAVE SOURCES BY FREQUENCY DIVISION
T. W. Lawrence Mar. 1983 27 p refs
(Rept-72/83/R/60/U) Copyright. Avail: Issuing Activity

A technique for microwave frequency division using mixers and injection locked oscillators was investigated. Experimental circuits give stable frequency division with a useful bandwidth and without any critical adjustment. A 7.2GHz source was successfully phase locked to a 450MHz reference using a frequency division by 16 circuit, with a reasonable tracking range. Author (ESA)

N83-33045# Sandia Labs., Albuquerque, N. Mex. Track and Cables Div.
ARTIFICIALLY TRIGGERED CLOUD-TO-GROUND LIGHTNING EXHIBITING CHARACTERISTICS OF NATURAL LIGHTNING
Thomas F. Stueber May 1982 30 p refs
(Contract DE-AC04-76DP-00789)

(SAND-82-0745) Avail: NTIS HC A03/MF A01

A single flash of cloud-to-ground lightning was artificially triggered in an experiment designed to test the effectiveness of lightning protection features designed into modern nuclear weapons. The lightning flash exhibited a downward streamer, characteristic of the most common type of natural lightning to ground but rare for triggered strokes. Triggering was accomplished using the trailing-wire rocket technique. Current measurements, using an a noninductive shunt, indicate a first return stroke peak amplitude in excess of 10,5000 amp with an initial rise time of less than 23 microsec. Multiple luminous peaks were recorded while at least one current polarity reversal occurred. Motion picture and open-shutter still cameras recorded the event on color film. Author

N83-33046# Hazeltine Corp., Greenlawn, N. Y.
PRECISE DESIGN OF INTERDIGITAL FILTERS, USING EVEN MODE/ODD MODE PARAMETERS
Alexander J. Kelly Apr. 1983 16 p refs
(Contract F33615-81-C-1432; AF Proj. 2002)
(AD-A128390; AFWAL-TR-83-1083) Avail: NTIS HC A02/MF A01 CSCL 09/5

This paper demonstrates that even-mode/odd-mode analysis, used for the design of parallel-coupled half-wavelength-resonator filters, can be used to design interdigital filters (quarter wavelength resonators, open circuited at one end, short circuited at the other). For an exact design, direct coupling to the input and output resonators must be used. However, with a resonable approximation, edge coupling can be utilized in place of direct coupling. Two design examples are given. Author (GRA)

N83-33047# Cameron (A. W. W.), Toronto (Ontario).
WORKSHOP PROCEEDINGS: ROTATING MACHINERY INSULATION
A. W. W. Cameron Dec. 1981 221 p refs Workshop held in St. Louis, Mo., 22-23 Sep. 1981 Sponsored by EPRI
(EPRI Proj. WS-81-182)
(DE82-901903; EPRI-EL-2211; CONF-8109110) Avail: NTIS HC A10/MF A01

A workshop on rotating machinery insulation, cosponsored by EPRI and Union Electric company, was held in St. Louis in September, 1981. The primary purpose of the workshop was to act as a forum for discussion between utilities and manufacturers on practical problems facing utilities in reducing the number and severity insulation related problems, and in testing and assessing the suitability for continuing operation of insulation systems in their machines. This report contains the texts of the formal presentations made during the workshop, and summaries of the open discussion and conclusions reached, including recommendations for future research in this technological area. For individual titles, see N83-33048 through N83-33062.

N83-33048# Duke Power Co., Charlotte, N.C.
AGING CONSIDERATION FOR ROTATING MACHINERY INSULATION SYSTEMS
W. J. Foley, Jr. *In* Cameron (A. W. W.) Workshop Proc.: Rotating Machinery Insulation Dec. 1981 6 p (For primary document see N83-33047 21-33)
Avail: NTIS HC A10/MF A01

This paper addresses rotating machinery insulation systems aging considerations primarily from a thermal standpoint and discusses current methods used in the industry to evaluate the effects of short-term high temperature ambients on overall insulation life. B.W.

N83-33049# Institut de Recherche de l'Hydro-Ontario. Research Div.
ADEQUACY OF ROTATING MACHINE TURN INSULATION TESTING
G. C. Stone and M. Kurtz *In* Cameron (A. W. W.) Workshop Proc.: Rotating Machinery Insulation Dec. 1981 7 p refs (For primary document see N83-33047 21-33)
Avail: NTIS HC A10/MF A01

In the past few years, Ontario Hydro has experienced a number of turn insulation failures in large motors in nuclear and fossil plants. Furthermore, one of the primary reasons for replacing stator windings in older hydraulic generators is the loss of turn insulation integrity. That is, the turn insulation condition often determines the end-of-life of a winding. This paper reviews the adequacy of published testing methods both for qualifying turn insulation systems and for quality control. From a utility's point of view, there appears to be a need for more rigorous 'type' and 'quality control' tests, equivalent to those now required for groundwall insulation. Author

N83-33050# Consumers Power Co., Jackson, Mich.
APPLICATION OF SEALED WINDINGS TO POWER GENERATING STATION MOTORS
J. D. Westbrook *In* Cameron (A. W. W.) Workshop Proc.: Rotating Machinery Insulation Dec. 1981 3 p (For primary document see N83-33047 21-33)
Avail: NTIS HC A10/MF A01

During the late 1960s and early 1970s it was noted that a high percentage of medium voltage form wound motor stator winding failures were caused by moisture. By 1972 sealed windings were being offered for rewinds. It was decided to try rewinding motors which had failed due to moisture with the sealed winding. From February 1972 through July 1981. 22 motor stators have been rewound with sealed windings. In summary, it is believed that the sealed winding, proved by test, is a valuable option for providing a high level of reliability in motor drives of all currently used sizes and voltages. B.W.

N83-33051# General Electric Co., Philadelphia, Pa.
FIELD INSULATION MATERIALS AND PROBLEMS
G. H. Vogt *In* Cameron (A. W. W.) Workshop Proc.: Rotating Machinery Insulation Dec. 1981 10 p (For primary document see N83-33047 21-33)
Avail: NTIS HC A10/MF A01

In a turbine generator the rotating field requires insulation materials and design considerations much different from the high voltage insulation used for armature windings. The principal properties to be looked for are mechanical strength, resistance to abrasion and resistance to thermal degradation. Electrical strength is also important because field windings are required to withstand a high potential test of ten times rated voltage. Some of the materials used over the years ranged from various kinds of fibers and flake mica composites, to asbestos, fiberglass epoxy or polyester laminates, Nomex and combinations of fiberglass, Nomex and insulating films. New materials have been applied to satisfy demands for better properties as generators grew in size and output, and it is the new materials that have made it possible to obtain more power from smaller machines. Field insulation materials and problems are discussed further. B.W.

N83-33052# Cameron (A. W. W.), Toronto (Ontario).
MICALASTIC HIGH-VOLTAGE INSULATION: DESIGN FEATURES AND EXPERIENCE
A. Wichmann (Utility Power Corp.) *In* Cameron (A. W. W.) Workshop Proc.: Rotating Machinery Insulation Dec. 1981 19 p refs (For primary document see N83-33047 21-33)
Avail: NTIS HC A10/MF A01

High-quality mica, carefully selected epoxy resins and a well-matched vacuum/pressure impregnation process determine the characteristics of the MICALASTIC insulation for large turbine-generators. Logical development and process manufacturing quality control have led to an insulation system of high quality and operating reliability. The first winding of a turbine-generator being impregnated and cured under vacuum with solvent-free synthetic resin in 1958 was designed for 10.5 kV rated voltage. Ever since, Siemens AG and Kraftwerk Union AG have used this type of insulation for all direct-cooled windings and also for an increasing number of indirect-cooled windings. At present, 240 turbine-generators with a total of more than 115,000 MVA output have been built. Since 1960, this insulation system has been registered for Siemens AG under the trade name MICALASTIC. The stator windings of the largest, single-shaft generators to date, rated

1560 MVA, 27 kV, has been built with MICALASTIC insulation.
Author

N83-33053# Brown Boveri Research Center, Baden (Switzerland).
MICADUR: COMPACT INSULATION SYSTEM FOR MEDIUM-SIZED TURBO GENERATORS
V. Aare (Brown Boveri Turbomachinery, Inc.) and R. H. Schuler *In* Cameron (A. W. W.) Workshop Proc.: Rotating Machinery Insulation Dec. 1981 9 p refs (For primary document see N83-33047 21-33)
Avail: NTIS HC A10/MF A01

A high voltage, Class F, vacuum pressure impregnated insulation system for wound stator cores of the medium size turbogenerators is described. With this total impregnation technique the insulation process has been revolutionized. The excellent characteristics of this synthetic resin insulation system have made it possible to redesign the end winding support system for decisive improvement in reliability. This has been confirmed by operating experience in recent years. Test procedures were modified to suit the new insulation process and new repair procedures have been developed. Author

N83-33054# Westinghouse Electric Corp., East Pittsburgh, Pa.
MECHANICAL PROPERTIES OF MICA INSULATION
E. M. Fort *In* Cameron (A. W. W.) Workshop Proc.: Rotating Machinery Insulation Dec. 1981 16 p refs (For primary document see N83-33047 21-33)
Avail: NTIS HC A10/MF A01

A large amount of work has been done and still is being done to investigate the effect of the electrical stress on the insulation, as well as the degradation caused by the elevated temperature by itself. But an increasing amount of work is now being done to also evaluate the mechanical behavior of the insulation. Because of the three components it contains, the insulation composite that is used today for the stator winding is rather complex. From an electrical standpoint at least, mica is the most important component of the insulation. With the present stage of insulation technology, no satisfactory substitute is available, and mica remains to be a vital component in all generator systems.
Author

N83-33055# McGill Univ., Montreal (Quebec).
PROS AND CONS OF VACUUM PRESSURE IMPREGNATION
T. Wright *In* Cameron (A. W. W.) Workshop Proc.: Rotating Machinery Insulation Dec. 1981 7 p (For primary document see N83-33047 21-33)
Avail: NTIS HC A10/MF A01

The advantages and disadvantages of using a vacuum pressure impregnation process in the application of insulating varnishes to high voltage electric coils are discussed. The process has the advantages of providing a void free system with high dielectric strength, mechanical resilience, chemical and moisture resistance, and good thermal capabilities. The disadvantages of high cost and large tank size requirements are noted. R.J.F.

N83-33056# Tennessee Valley Authority, Knoxville.
TVA'S SPECIFICATION REQUIREMENTS AND PRE-OPERATIONAL CHECKS FOR ROTATING ELECTRICAL MACHINERY INSULATION
J. K. Greene *In* Cameron (A. W. W.) Workshop Proc.: Rotating Machinery Insulation Dec. 1981 6 p (For primary document see N83-33047 21-33)
Avail: NTIS HC A10/MF A01

The Tennessee Valley Authority's specification requirements and operational checks for rotating electrical machinery insulation are discussed. Turbogenerators, hydromotor generators, and medium voltage motors are discussed. Both preoperation and performance tests are described. Problems in analysis and retroactive qualification of selected motors for safety related service in nuclear power plants are discussed. R.J.F.

N83-33057# Cameron (A. W. W.), Toronto (Ontario).
GENERATOR INSULATION SYSTEM TESTING
J. A. Forster (Forster (J. A.) Engineering, Ltd.) *In* Cameron (A. W. W.) Workshop Proc.: Rotating Machinery Insulation Dec. 1981 6 p (For primary document see N83-33047 21-33)
Avail: NTIS HC A10/MF A01

Tests of generator insulation systems are discussed. Slot discharge/corona, power factor tip-up, and accelerated life tests are considered. Voids in insulation systems, excessive tip-up, and damaging effects of temperature, vibration, and aging are discussed. R.J.F.

N83-33058# Duke Power Co., Charlotte, N.C. Research Div.
EXPERIENCE WITH ON-LINE GENERATOR PARTIAL DISCHARGE TESTS
M. Kurtz, G. C. Stone, and W. F. Jannaway *In* Cameron (A. W. W.) Workshop Proc.: Rotating Machinery Insulation Dec. 1981 15 p refs (For primary document see N83-33047 21-33)
Avail: NTIS HC A10/MF A01

Partial discharge tests found useful in assessing the condition of stator winding insulation systems in hydraulic generators and in the early detection of incipient problems are discussed. This on-line test procedure was not only found to be less costly to implement than early methods, but also was shown to be capable of yielding meaningful data under noisy conditions. R.J.F.

N83-33059# American Electric Power Service Corp., New York.
ELECTRICAL SPECTRUM ANALYSIS OF OPERATING HYDRO ELECTRIC MACHINES
J. E. Timperley *In* Cameron (A. W. W.) Workshop Proc.: Rotating Machinery Insulation Dec. 1981 12 p (For primary document see N83-33047 21-33)
Avail: NTIS HC A10/MF A01

The electrical spectrum analysis of the operation of five pumped storage machines is discussed. It was found that machines without electrical problems produced little radio noise, although all machines produced some noise. Severe problems produced severe radio noise. If stator deterioration increases, the noise level increases. Similar machines produce similar electrical spectrum signatures. The general source of discharges can be located. A likelihood of failure can be calculated from spectrum analysis.
R.J.F.

N83-33060# Cameron (A. W. W.), Toronto (Ontario).
PREVENTIVE MAINTENANCE TESTING OF GENERATOR INSULATION
E. H. Povey (Doble Engineering Co.) and A. L. Rickley (Doble Engineering Co.) *In* Cameron (A. W. W.) Workshop Proc.: Rotating Machinery Insulation Dec. 1981 14 p (For primary document see N83-33047 21-33)
Avail: NTIS HC A10/MF A01

Preventive maintenance testing of electric generator insulation is discussed. High potential tests, direct voltage measurements, alternating voltage measurements, and visual inspection are discussed. R.J.F.

N83-33061# Westinghouse Electric Corp., East Pittsburgh, Pa.
RADIO FREQUENCY MONITORING OF GENERATORS
F. T. Emery *In* Cameron (A. W. W.) Workshop Proc.: Rotating Machinery Insulation Dec. 1981 22 p refs (For primary document see N83-33047 21-33)
Avail: NTIS HC A10/MF A01

The development of turbine-generator on-line diagnostics through the monitoring of a generator's neutral radio frequency current employing an on-line radio frequency monitor is discussed. A current transformer with a frequency response of 30 Hz to 30 MHz is used to measure radio frequency current flow in the generators neutral lead. Test techniques, simulation tests of generator arcing, field measurement of radio frequency spectra, and continuous fixed frequency monitoring are discussed. R.J.F.

N83-33062# Biddle (James G.) Co., Plymouth Meeting, Pa.
VERY LOW (0.1 Hz) TESTING OF ROTATING MACHINERY INSULATION
P. H. Reynolds *In* Cameron (A. W. W.) Workshop Proc.: Rotating

Machinery Insulation Dec. 1981 6 p (For primary document see N83-33047 21-33)
Avail: NTIS HC A10/MF A01

Methods which permit partial discharge and power factor to be measured directly using the 0.1 Hz supply as the source of measurements are discussed. These permit analysis of the condition of the turbogenerator insulation both when the machine is installed and at intervals throughout its operating life. R.J.F.

N83-33063# California Univ., Berkeley. Lawrence Berkeley Lab. Engineering and Technical Services Div.
AFTERPULSE TIME-SPECTRUM MEASUREMENT OF RCA 8850 PHOTOMULTIPLIER
C. C. Lo and B. Leskovar Oct. 1982 8 p refs Presented at IEEE Nucl. Sci. Symp., Washington, D.C., 20 Oct. 1982
(DE83-004159; LBL-13619; CONF-821011-31) Avail: NTIS HC A02/MF A01

The photomultiplier dark pulse height, signal induced pulse height, and afterpulse time spectra have been measured on three RCA 8850 52 mm diameter photomultipliers. The first dynode of this photomultiplier has a cesium activated, gallium phosphide secondary emitting surface. Measurement techniques and the measuring systems are described in detail. DOE

N83-33064# Los Alamos Scientific Lab., N. Mex.
DEVELOPMENT AND TESTING OF A 50-KA, PULSED SUPERCONDUCTING CABLE
John J. Wollan, W. C. Hamilton, J. DeClerc, and B. A. Zeitlin 1982 6 p refs Presented at the Appl. Superconductivity Conf., Knoxville, Tenn., 30 Nov. 1982 Prepared in cooperation with Intermagnetics General Corp., Guilderland, N.Y.
(Contract W-7405-eng-36)
(DE83-003556; LA-UR-82-3424; CONF-821108-7) Avail: NTIS HC A02/MF A01

Prototype cables for 7.5-T, pulsed field application in Tokamak poloidal coils were designed, fabricated, and evaluated. Successful fabrication of a 10 m superconducting sample represents the largest superconducting cable ever made. Details of the fabrication, the problems expected and encountered, and the solutions to those problems are discussed. Results of stability measurements on the superconducting prototype also are presented. DOE

N83-33065# Oak Ridge National Lab., Tenn. Atomic, Molecular and High Voltage Physics Group.
AUTOMATIC CONTROL OF A HIGH-VOLTAGE IMPULSE GENERATOR BY A MICROCOMPUTER
A. Fatheddin, V. K. Lakdawala, R. Y. Pai, and L. G. Christophorou 1983 9 p refs Presented at the Southeastern IEEE Region 3 Conf., Orlando, Fla., 10 Apr. 1983
(Contract W-7405-eng-26)
(DE83-012096; CONF-830454-1) Avail: NTIS HC A02/MF A01

A microcomputer based control system which operates a high voltage impulse generators and then processes experimental data collected by laboratory instruments is described. The statistical nature of these experiments requires the charging of the generator of the procedure frees the experimenter for other tasks. DOE

N83-33066# Army Mobility Equipment Research and Development Center, Fort Belvoir, Va. Electrical Power Lab.
LOAD EFFECTS ON NOLA-TYPE INDUCTION MOTOR POWER-FACTOR CONTROLLERS ON FUEL-CELL INVERTERS
31 Dec. 1982 74 p
(Contract DE-AI01-79CS-40152)
(DE83-011689; DOE/CS-40152/T2) Avail: NTIS HC A04/MF A01

Tests performed on power inverters using Nola-type power factor controllers (PFC) and fractional horsepower single phase induction motors as loading devices are discussed. The inverters were designed for integral operation with fuel cell power plants and represented four differential developmental designs ranging in power ratings from 1.5 kW to 5 kW. In addition, a 1000 VA commercial aircraft-type inverter was also tested. Results are presented and discussed. DOE

N83-33067# California Univ., Livermore. Lawrence Livermore Lab.
HIGH-EXPLOSIVE-DRIVEN DELAY LINE PULSE GENERATOR
J. W. Shearer 15 Nov. 1982 27 p refs Presented at the 3rd Intern. Conf. on Magagauss Magnetic Field Generation and Related Topics, Novosibirsk (USSR), 13-17 Jun. 1983
(Contract W-7405-eng-48)
(DE83-003877; UCRL-88281; CONF-830606-1) Avail: NTIS HC A03/MF A01

The inclusion of a delay line circuit into the design of a high-explosive-driven generator shortens the time constant of the output pulse. After a brief review of generator concepts and pulse-shortening methods, a geometry is presented which incorporates delay line circuit techniques into a coil generator. The circuit constants are adjusted to match the velocity of the generated electromagnetic wave to the detonation velocity of the high explosive. The proposed generator can be modeled by adding a variable inductance term to the telegrapher's equation. A particular solution of this equation is useful for exploring the operational parameters of the generator. The duration of the electromagnetic pulse equals the radial expansion time of the high explosive driven armature until it strikes the coil. Because the impedance of the generator is a constant, the current multiplication factor is limited only by nonlinear effects such as voltage breakdown, diffusion, and compression at high energies. DOE

N83-33068# Los Alamos Scientific Lab., N. Mex.
THE 150-kW, 450-MHz GYROCON RF GENERATOR
P. J. Tallerico 1983 4 p refs Presented at the Particle Accelerator Conf., Santa Fe, N. Mex., 21-23 Mar. 1983
(Contract W-7405-eng-36)
(DE83-009974; LA-UR-83-756; CONF-830311-51) Avail: NTIS HC A02/MF A01

The output power and conversion efficiency of the Los Alamos gyrocon were increased by a factor of 150. Major improvements in the phase and amplitude control system and in understanding the electron multipactor and surface conditioning processed the output power. The highest measured efficiency on this gyrocon is 23%, which was obtained with several combinations of parameters. Both the output power and the efficiency are a factor of 3 below the design values, and several possibilities are examined to remove the discrepancy between theory and experiment. DOE

N83-33069# Los Alamos Scientific Lab., N. Mex.
REGULATOR TO CONTROL CURRENT SHARING AMONG PARALLEL-CONNECTED POWER TRANSISTORS
F. D. Wells, E. F. Higgins, and M. E. Mauro 1983 4 p refs Presented at the Particle Accelerator Conf., Santa Fe, N. Mex., 21-23 Mar. 1983
(Contract W-7405-eng-36)
(DE83-009941; LA-UR-83-608; CONF-830311-76) Avail: NTIS HC A02/MF A01

A current regulator that controls the peak current of a power transistor driving the inductive load, such as magnet coils is described. The current pulse has a 0.1 to 1 ms adjustable duration with duty cycle to 5%. Ultimately, the pulse length must be approximately 7 ms with 50% duty cycle. The peak current nominally is 200 A, as set by a reference pulse. Several transistors, each controlled by an individual regulator, are connected in parallel to provide the total peak load current. The regulators compensate for differences between the power transistors and assure equal current sharing among the collectors. The regulator comprises an 8 bit multiplying digital to analog (D/A) converter that drives the base of the power transistor, an 8 bit up-down counter, an analog differencing circuit, and a comparator. A current sensing resistor in the transistor's collector produces the second input to the differencing circuit. Regulation is accomplished over a collector current range of 200 + or - 50 A per stage. DOE

N83-33070# California Univ., Livermore. Lawrence Livermore Lab.
HIGH-VOLTAGE, HIGH-SPEED SWITCHING TRANSISTORS USING CURRENT-MODE SECOND BREAKDOWN

Michael D. Pocha and Jackson C. Koo 4 Feb. 1983 3 p refs Presented at the 33rd Electronic Components Conf., Orlando, 16 May 1983
(Contract W-7405-eng-48)
(DE83-006745; UCRL-88309; CONF-830517-2) Avail: NTIS HC A02/MF A01

Current mode second breakdown is a fast negative resistance phenomenon which occurs in bipolar epitaxial transistors and which can be used to generate fast rise time electrical pulses. A study of this effect and the design of devices capable of generating pulses of greater than 500 volts with 3 to 4 ns rise time is described. DOE

N83-33071# Sandia Labs., Albuquerque, N. Mex. Diagnostics Div.
INTENSE MICROWAVE DIAGNOSTICS Status Report
J. Chang, J. A. Fesch, W. P. Ballard, and L. C. Pitchford 1983 5 p refs Presented at the 2nd Natl. Conf. on High Power Microwave Technol., Adelphi, Md., 1 Mar. 1983
(Contract DE-AC04-76DP-00789)
(DE83-009187; CONF-830314-5) Avail: NTIS HC A02/MF A01

Several diagnostic techniques for characterizing intense pulsed microwave sources are under development at Sandia. These techniques include Glo-balls, calorimeters, and an electrooptical frequency and power meter. These diagnostic concepts and their status are discussed. DOE

N83-33072# Brookhaven National Lab., Upton, N. Y.
LINEAR AND NONLINEAR ANALYSIS OF HIGH-POWER RF AMPLIFIERS
M. Puglisi 1983 4 p refs Presented at the Particle Accelerator Conf., Santa Fe, N. Mex., 21-23 Mar. 1983
(Contract DE-AC02-76CH-00016)
(DE83-010065; BNL-32682; CONF-830311-38) Avail: NTIS HC A02/MF A01

After a survey of the state variable analysis method the final amplifier for the CBA is analyzed taking into account the real beam waveshape. An empirical method for checking the stability of a non-linear system is also considered. DOE

N83-33073# Sandia Labs., Albuquerque, N. Mex.
DEVELOPMENT OF A LONG-LIFE, HIGH-RELIABILITY, HIGH-ENERGY-DENSITY, REPETITIVE-PULSE, CAPACITOR TECHNOLOGY
G. H. Mauldin, W. C. Nunnally (Los Alamos Scientific Lab., N. Mex.), M. C. Thompson (Los Alamos Scientific Lab., N. Mex.), and W. J. Sarjeant (State Univ. of N. Y., Buffalo) 1983 3 p refs Presented at the 33rd Electron. Components Conf., Orlando, Fla., 16 May 1983
(Contract DE-AC04-76DP-00789)
(DE83-006737; SAND-82-2367C; CONF-830517-1) Avail: NTIS HC A02/MF A01

Evolving power conditioning system requirements in the areas of magnetic confinement fusion, inertial confinement fusion, ion propulsion engines, particle beam technology, radar, communications, and medical electronics will place severe demands upon repetitive pulse power system components. The energy storage capacitor is one principal system pacing component. A unique capacitor technology which is reliable and space efficient was developed. This technology is based upon impregnation of plastic film capacitor rolls with perfluorocarbon insulating liquids. A 300-kW capacitor discharge test facility was activated. This facility allows testing at high average powers and high repetition rates. It employs extensive diagnostic instrumentation which allows sophisticated analysis of the test results. The test facility and test results are described. DOE

N83-33074# California Univ., Livermore. Lawrence Livermore Lab.
PROJECTILE-POWER-COMPRESSED MAGNETIC-FIELD PULSE GENERATOR
Robert H. Barlett, Hitoshi T. Takemori, and Jay B. Chase 17 Mar. 1983 17 p refs Presented at the 3rd Intern. Conf. on Magagauss Magnetic Field Generation and Related Topics, Novosibirsk, Russia, 13-17 Jun. 1983
(Contract W-7405-eng-48)
(DE83-012111; UCRL-88704; CONF-830606-7) Avail: NTIS HC A02/MF A01

Design considerations and experimental results are presented of a compressed magnetic field pulsed energy source. A 100-mm diameter, gun fired projectile of approx. 2MJ kinetic energy was the input energy source. An initial magnetic field was trapped and compressed by the projectile. With a shorted load, a magajoule in a ranchenry was the design goal, 50% energy transformation from kinetic to magnetic. A 5% conversion was the highest recorded before gauge failure. DOE

N83-33075# Sandia Labs., Albuquerque, N. Mex.
BONDING WIRE FOR SEMICONDUCTOR-ELEMENT USE
Tanaka Kikinzoku Kogyo Kabushiki Kaisha Jan. 1983 7 p Transl. into ENGLISH of Japanese patent no. 1980-73622, 31 May 1980 7 p
(Contract DE-AC04-76DP-00789)
(DE83-007239; SAND-83-6000) Avail: NTIS HC A02/MF A01

A bonding wire used to make electrical connection between a chip electrode and the external lead of a semiconductor element is discussed. The patent specifies the use of palladium wire with purity greater than 99.97% or better by weight ratio. DOE

N83-33076# Rockwell International Corp., Golden, Colo. Wind Energy Research Center.
ANALYTICAL AND EXPERIMENTAL INVESTIGATION OF A WOUND-ROTOR VARIABLE-SPEED, CONSTANT-FREQUENCY GENERATOR FOR SMALL WIND ENERGY SYSTEMS
K. K. Higashi, G. P. Minges, and G. D. Price Oct. 1982 79 p refs
(Contract DE-AC04-76DP-03533)
(DE83-012273; RFP-3488) Avail: NTIS HC A05/MF A01

The use of a wound rotor variable speed, constant frequency generator with small wind systems was investigated. The main initial objective was to demonstrate proof of concept under controlled conditions. The feasibility of this application was confirmed and it was shown that improved performance could be expected over a constant speed, constant frequency generator systems. The ability to maintain a constant tip speed ratio near the maximum rotor performance coefficient over a wide range of wind speeds is noted. A substantial increase in annual energy output can be expected from VSCF operation. Controlled start up and shutdown can also reduce the high transient torques and concomitant inrush currents common to induction generator systems. DOE

N83-33077# Oesterreichische Akademie der Wissenschaften, Vienna. Inst. fuer Weltraumforschung.
VACUUM MEASURING SYSTEM FOR CHANNEL ELECTRON MULTIPLIERS In GERMAN; ENGLISH summary [VAKUUM-MESSEINRICHTUNG FUER KANAL-ELEKTRONEN-VERVIELFACHER]
A. Urban and W. Riizinger Mar. 1982 31 p refs Prepared in cooperation with Graz Univ.
(IWF-8206) Avail: NTIS HC A03/MF A01

A system in which channel electron multipliers can be calibrated to be used as detectors of electrons or protons in space is described. The system consists of an electron gun built in a vacuum chamber and equipped with a control Faraday cup and a high impedance electrometer to measure electron fluxes. It contains an electron flux control with buffer amplifier, a proportional integration differentiation regulation unit, and a heating current power regulation. Detection efficiency dependency on the energy of the incident particles, the saturation that yields decreasing count rates at continuously increasing particle flux, or the statistical pulse height distribution giving information about well or restrictedly usuable multipliers can be measured. The optimum supply voltage of the multipliers at which small fluctuations do not cause any changes of the pulse height distribution, and the function

count rates vs. supply voltage for selecting good or poor multipliers can also be determined. Author (ESA)

N83-32724# Air Force Systems Command, Wright-Patterson AFB, Ohio.
ELECTRONIC CIRCUIT ANALYSIS LANGUAGE (ECAL)
Chen Chenghang *In its* Acta Aeron. et Astronautica Sinica (FTD-ID(RS)T-1605-82) 4 Mar. 1983 p 127-137a refs Transl. into ENGLISH from Hang Kong Xuebao (China), v. 3, no. 3, Sep. 1982 p 81-87 (For primary document see N83-32717 21-01)
Avail: NTIS HC A08/MF A01 CSCL 09/3

N83-33281# Nagoya Univ. (Japan).
A DIGITAL PHASE DRIVER FOR THE SWEPT-LOBE LAMBDA 8-CM RADIOHELIOGRAPH
Chikayoshi Torii *In* Nagoya Univ. Proc. of the Res. Inst. of Atmospherics, Nagoya Univ., Vol. 30 Mar. 1983 p 79-84 refs In JAPANESE; ENGLISH summary (For primary document see N83-33274 21-42)
Avail: NTIS HC A06/MF A01

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

N83-33078 Minnesota Univ., Minneapolis.
A CALCULATION PROCEDURE FOR PARABOLIC FLOWS WITH ADAPTIVE GRID AND SPLINE TECHNIQUES Ph.D. Thesis
Sumanta Achary 1982 212 p
Avail: Univ. Microfilms Order No. DA8301899

A calculation procedure for parabolic flows with adaptive grid and Flux-Spline techniques was developed. The procedure represents an important over existing calculation methods for parabolic flows. The adaptive grid technique redistributes the nodal points at each step of the calculation procedure, so that a finer mesh is obtained in regions of rapid profile variations. Thus, critical regions in the flow field are always accurately resolved. In many situations, the adaptive grid could be skewed appreciably. The conventional differencing schemes did not perform satisfactorily with skewed grids. Therefore, a more suitable differencing scheme, called the omega-tracing scheme, was developed. The Flux-Spline technique incorporates a higher order profile assumption. Here, the total cross-stream flux is assumed to vary linearly in a control volume (as opposed to the conventional constant flux assumption). Both the flux and the dependent variables are unknown and have to be solved for. Dissert. Abstr.

N83-33079 Iowa Univ., Iowa City.
DEVELOPMENT OF FINITE ANALYTIC METHOD FOR UNSTEADY THREE-DIMENSIONAL NAVIER-STOKES EQUATIONS Ph.D. Thesis
Hamn-Ching Chen 1982 418 p
Avail: Univ. Microfilms Order No. DA8229918

Unsteady 1D, 2D and 3D incompressible Navier-Stokes equations are numerically analyzed by a numerical scheme called the finite analytic method. The basic idea of the finite analytic method is the incorporation of a local analytic solution in the numerical solution of linear and nonlinear partial differential equations. The local analytic solutions for unsteady 1D, 2D and 3D convective transport equations are obtained from locally linearized governing equations by specifying suitable initial and boundary conditions for each local element. When the local analytic solution is evaluated at a given nodal point, it gives an analytic algebraic relationship between a nodal value in a local element to its neighboring nodal points. The solution of the problem is then achieved by solving the system of algebraic equations. Depending on the boundary and initial functions chosen to represent the boundary and initial conditions for each local element, a number of local analytic solutions are derived. The results show that the boundary approximation based on the combination of exponential and linear function is the best one since the boundary function thus constructed is the natural solution of the governing equation. The finite analytic coefficients thus obtained are shown to be relatively simple and do give the correct asymptotic behavior for both diffusion and convection dominated cases. Dissert. Abstr.

N83-33080 Purdue Univ., Fort Wayne, Ind.
WAVE PROPAGATION IN GRAPHITE/EPOXY LAMINATE DUE TO IMPACT Ph.D. Thesis
Tein-Min Tan 1982 133 p
Avail: Univ. Microfilms Order No. DA8300965

Harmonic wave in a graphite/epoxy laminate was studied using a plate theory that includes transverse shear deformation. Propagation of stress wave front in the laminate was also investigated. The velocity with which the wave front propagates was discussed and the position of wave front as function of time was constructed using ray theory. Contact behavior between spherical steel indenters and graphite/epoxy laminates was determined by performing statical identification tests. Indentation was measured using a linear differential variable transformer which allowed more accurate estimations of permanent deformations in the laminate. Relation between permanent indentation and maximum indentation at unloading was found to be approximately linear from the test data. It was shown that the loading and reloading curves follow the power laws with $n = 1.5$ very well while the power index for the unloading curves exhibited wider scatter. The experimental contact laws were incorporated into a 9-node isoparametric plate finite element program for impact analysis. An impact experiment on graphite/epoxy laminated plate was conducted to verify the validity of the statically determined contact laws in the application of impact analysis. Dissert. Abstr.

N83-33081 Connecticut Univ., Storrs.
THE PREDICTION OF COMPRESSIBLE, VISCOUS SECONDARY FLOW IN CHANNEL PASSAGES Ph.D. Thesis
Roger Leo Davis 1982 474 p
Avail: Univ. Microfilms Order No. DA8300124

A numerical procedure which solves for the compressible, viscous secondary flow structure in channels was developed. A computer program which calculates the simultaneous solution of the time dependent conservation equations for compressible, viscous flow is documented. A second ordered accurate in space and time finite element (volume) procedure which substitutes linear or quadratic approximating functions for the primary variables into the time dependent conservation equations is used to calculate the time rate derivatives of these variables. Updating of these variables in time proceeds according to the corresponding Taylor series expansion and stability time step restriction until a pseudo-steady state flow condition is reached. Dissert. Abstr.

N83-33082 ESDU International Ltd., London (England).
HEAT PIPES: GENERAL INFORMATION ON THEIR USE, OPERATION AND DESIGN
Aug. 1980 40 p refs Sponsored by Institution of Chemical Engineers and Institution of Mechanical Engineers
(ESDU-80013; ISBN-0-85679-296-9; ISSN-0141-402X) Avail: ESDU

This Data Item is an addition to the Heat Transfer Subseries. A review of the various devices that are commonly called heat pipes, their applications and how they operate is provided. Information of a general nature concerned with the use and design (but not manufacture) of heat pipes is provided. Other data give methods for calculating the performance of two-phase closed thermosyphons, data on wick properties, and data on the physical properties of working fluids. ESDU

N83-33083 ESDU International Ltd., London (England).
THERMOPHYSICAL PROPERTIES OF HEAT PIPE WORKING FLUIDS: OPERATING RANGE BETWEEN -60 DEG C AND 300 DEG C

Aug. 1980 24 p refs
(ESDU-80017; ISBN-0-85679-300-0; ISSN-0141-402X) Avail: ESDU

This Data Item is an addition to the Heat Transfer Subseries. Tabulated values and equations of the saturation-line thermophysical properties of a number of fluids suited to capillary heat pipe and thermosyphon use such as described in ESDU 79012 and 81038 are presented. The fluids considered are acetone, ammonia, diphenyl ether/diphenyl (e g. Dowtherm A), o-dichlorobenzene (e.g. Dowtherm E), methanol, toluene and water which are all suitable fluids operating close to normal temperatures. The properties considered are vapor pressure, density of the saturated liquid and vapor, specific latent heat of vaporization, specific heat capacity of the saturated liquid, dynamic viscosity of the saturated liquid and vapor, thermal conductivity of the saturated liquid and surface tension. Figures of merit (parameters based on working fluid properties indicating the relative suitability of the fluids for various operating temperatures) are given for both capillary-driven heat pipes and thermosyphons. ESDU

N83-33084 ESDU International Ltd., London (England).
RADIAL, MIXED AND AXIAL-FLOW PUMPS: INTRODUCTION, AMENDMENT A
Feb. 1981 44 p refs Sponsored by the Institution of Chemical Engineers and Institution of Mechanical Engineers
(ESDU-80030-Amend-A; ISBN-0-85679-313-2; ISSN-0141-4011) Avail: ESDU

This Data Item is an addition to the Fluid Mechanics Internal Flow Subseries. Background information intended to guide the nonspecialist in the selection of an appropriate type of pump, for writing its specification, and for the appraisal of tenders is provided. Sections on pump performance characteristics, illustrations of typical configurations, features of national and international standards on pumps and on calculation of system requirements are included. An extensive section on matching the pump to the system includes guidance on multipump operation and on waterhammer calculations. ESDU

N83-33085 ESDU International Ltd., London (England).
RADIAL, MIXED AND AXIAL-FLOW PUMPS: SIZE ESTIMATION AND SPECIFICATION, AMENDMENT A
Nov. 1980 35 p refs Sponsored by Institution of Chemical Engineers and Institution of Mechanical Engineers
(ESDU-80031-Amend-A; ISBN-0-85679-314-0; ISSN-0141-4011) Avail: ESDU

This Data Item is an addition to the Fluid Mechanics Internal Flow Subseries. Performance estimates for a wide range of rotodynamic pumps are provided in order to anticipate the salient features of a suitable standard pump. This information which would otherwise only be available from a bulky collection of manufacturers' catalogs is complemented by a methodical procedure to pinpoint the most suitable pump configuration. Charts giving rapid estimates of size and efficiency (with formulae to allow easy programming for calculators or computers) are given together with approximate correlations of suction and discharge flange sizes, and data showing the effects that liquids of high viscosity have on pump performance. The information is supported by a comprehensive example which is backed up by numerous cross references to ESDU 80030 which provides a general introduction to pump performance considerations. ESDU

N83-33086 ESDU International Ltd., London (England).
A GUIDE TO THE THERMAL AND MECHANICAL CHARACTERISTICS OF REFRACTORY LINING MATERIALS
Dec. 1980 55 p refs Sponsored by Institution of Chemical Engineers and Institution of Mechanical Engineers
(ESDU-80041; ISBN-0-85679-324-8; ISSN-0141-14011) Avail: ESDU

This Data Item is an addition to the Heat Transfer Subseries. Background information and guidance on factors important in the selection, arrangement, and mechanical support of refractory lining systems is provided. The information given assists with specification writing and tender preparation and appraisal of refractory lining systems for high temperature processes including metal treatment, chemical and petro-chemical processing, glass and pottery manufacture, steam supply, heat exchange and venting of high temperature exhaust gases. The data provided include mechanical and thermal properties of a range of refractories, ceramic fibers and back-up insulation as well as the applicability of fixing and mechanical support systems. Guidance is given on the interpretation of test data and manufacturers' data. Lists of sources of more detailed information on test methods, manufacturers names, and their product trade names are also included. ESDU

N83-33087 ESDU International Ltd., London (England).
RADIAL, MIXED AND AXIAL-FLOW PUMPS: GLOSSARY OF TERMS
Feb. 1981 37 p refs
(ESDU-81001; ISBN-0-85679-326-4; ISSN-0141-4011) Avail: ESDU

This Data Item is an addition to the Fluid Mechanics Internal Flow Subseries. A glossary is given of the terminology used in the rotodynamic pump industry, covering both fluid mechanics and mechanical design aspects of pump engineering. Many entries are illustrated and extensive cross references are used to clarify the individual entries. ESDU

N83-33088 ESDU International Ltd., London (England).
RADIAL, MIXED AND AXIAL FLOW PUMPS: CONVERSION FACTORS
Feb. 1981 23 p refs Sponsored in part by the Institution of Chemical Engineers and the Institution of Mechanical Engineers
(ESDU-81002; ISBN-0-85679-327-2; ISSN-0141-4011) Avail: ESDU

This Data Item is an addition to the Fluid Mechanics Internal Flow Subseries. A comprehensive set of conversion factors between sets of units in common use in pump engineering, including SI and technical metric, foot-lb-second and other US and Imperial systems of units is provided. Nineteen quantities are covered including density, specific speed, pressure, viscosity and volume flow rate. ESDU

N83-33089 ESDU International Ltd., London (England).
PRESSURE LOSSES CAUSED BY OBSTRUCTIONS IN DUCTS AND PIPES
Jul. 1981 10 p refs Sponsored by Institution of Chemical Engineers and Institution of Mechanical Engineers
(ESDU-81021; ISBN-0-85679-346-9; ISSN-0141-4011) Avail: ESDU

This Data Item is an addition to the Fluid Mechanics Internal Flow Subseries. A means of estimating pressure losses caused by bluff obstructions in pipe and duct systems, such as a pipe crossing a duct, an instrumentation housing projection into a pipe or equipment obstructing a mine gallery is presented. The data cover bluff bodies of flat plate, wedge, rectangular block or circular cylindrical sections in ducts or pipes of all cross sections, for liquid flow and incompressible gas flow. The derivation of, and causes of uncertainty in, the data are also discussed. ESDU

N83-33090 ESDU International Ltd., London (England).
HEAT PIPES-PERFORMANCE OF 2-PHASE CLOSED THERMOSIPHONS
Jul. 1982 28 p refs
(ESDU-81038-Amend-B) Avail: ESDU

This Data Item is an addition to the Heat Transfer Subseries. Processes involved in a thermosiphon, whereby high rates of heat transfer can be obtained between surfaces that have only a small temperature difference between them, are described. Heat is transferred by means of evaporation and condensation, and gravity is used to return the liquid film to the evaporator as compared with capillary-driven designs which use a wick. The thermosiphons discussed have: (1) circular tubes of uniform cross section; (2) a single component working fluid and no noncondensable gas; (3) either no wick or a simple wick or insert in the evaporator wall; and (4) angles of inclination to the horizontal 5 to 90 degrees. The maximum overall rate of heat transfer depends on the overall

temperature difference and the sum of the thermal resistances of the various solid, liquid, and vaporous media and interfaces involved. Methods are given for calculating each thermal resistance. Advice and expressions are also given for the limits of vapor pressure, sonic velocity in the vapor, dry-out, bbiling limit, and the counter-current flow limit. ESDU

N83-33091 ESDU International Ltd., London (England).
PRESSURE LOSSES ACROSS ORIFICE PLATES, PERFORATED PLATES AND THICK ORIFICE PLATES IN DUCTS
8 Sep. 1983 17 p refs Sponsored in part by the Royal Aeronautical Society, Inst. of Chemical Engineers, and Inst. of Mechanical Engineers
(ESDU-81039; ISBN-0-85679-372-8; ISSN-0141-4011) Avail: ESDU

This Data Item is an addition to the Fluid Mechanics Internal Flow Subseries. Basic pressure loss coefficient data for use in the calculation of pressure losses for incompressible flow in ducts containing orifice plates, perforated plates and thick orifice plates or in the determination of a suitable geometry for a pressure reducing orifice in a duct are presented. Data are given for porosities in the range 0.001 to 1.00. Although the data were derived basically for symmetrical arrangements of circular holes in circular plates it was found that they apply reasonably well for square ducts, square holes and small departures from symmetry. General features of flow through orifices are discussed. A flow chart calculation procedure is included. Compressible flow is dealt with in ESDU 82009. ESDU

N83-33092 ESDU International Ltd., London (England).
HEAT TRANSFER COEFFICIENTS FOR WATER OR STEAM IN PLAIN CIRCULAR TUBES: FULLY-DEVELOPED TURBULENT FLOW
Nov. 1981 12 p
(ESDU-81044; ISBN-0-85679-377-9; ISSN-0141-402X) Avail: ESDU

This Data Item is an addition to the Heat Transfer Subseries. Heat transfer coefficient data and enthalpy data specifically for the fully developed turbulent flow of water or steam in plain circular tubes are provided. The method uses generalized Stanton number data. The data are presented in the easy to use form of the variation of the physical properties of water substance with temperature and pressure were already taken into account. The data are applicable for any process involving single phase heat transfer where the working fluid is water or steam, e.g. process heat exchangers where cooling water is used on one side. ESDU

N83-33093 ESDU International Ltd., London (England).
FORCED CONVECTIVE HEAT TRANSFER IN CONCENTRIC ANNULI WITH TURBULENT FLOW
Nov. 1981 36 p refs
(ESDU-81045-Amend-A; ISBN-0-85679-378-7; ISSN-0141-402X) Avail: ESDU

This Data Item is an addition to the Heat Transfer Subseries. From a wide range of data sources, a correlation giving the variation of Stanton number with Reynolds number and Prandtl number for a complete range of annulus diameter ratios from zero (plain circular tube) to unity (parallel plates) is derived. The basic calculation is derived for a uniform heat flux at one surface with the other surface insulated. Data and method for dealing with other situations are also provided. These include uniform heat flow, of equal or differing magnitudes, at both surfaces, varying heat flux at one or both surfaces, and constant surface temperature at one or both surfaces. In addition, some qualitative guidance is provided on the influence of effects such as free convections, eccentricity, and developing temperature profile. ESDU

N83-33094 ESDU International Ltd., London (England).
AN INTRODUCTION AND GUIDE TO NOISE IN VENTILATION, AIR-CONDITIONING AND OTHER DUCTING SYSTEMS
Jul. 1982 18 p refs
(ESDU-82001; ISBN-0-85679-395-7; ISSN-0141-4011) Avail: ESDU

This Data Item is an addition to the Fluid Mechanics Internal Flow Subseries. An introduction to acoustic terminology and their relationships and general guidance on the principles of noise control in ventilation and air-conditioning systems, and similar types of ducting systems are presented. Data are provided on room acoustic characteristics, including values of absorption coefficients for typical room surface materials and fittings that are required for the estimation of sound pressure levels within the room. Noise criteria and acoustic factors that should be taken into consideration in the design of ventilation and air-conditioning systems are also discussed. ESDU

N83-33095 ESDU International Ltd., London (England).
REDUCTION OF SOUND IN VENTILATION AND SIMILAR AIR DISTRIBUTION SYSTEMS
Jul. 1982 19 p refs
(ESDU-82002; ISBN-0-85679-396-5; ISSN-0141-4011) Avail: ESDU

This Data Item is an addition to the Fluid Mechanics Internal Flow Subseries. A means of estimating the attenuation of sound in lined plenum chambers and ducts, and through silencers of the types used in ventilation and air-conditioning systems is given. Data are provided in graphical or tabular form for the estimation of typical silencer insertion loss, airflow generated noise and pressure loss. Both rectangular splitter silencers and cylindrical silencers are considered. The data may be used in the initial design of a system or to investigate the appropriate remedial action for an installed air distribution system that is found to be too noisy. The location of silencers in the duct system is considered, and an example is given to illustrate the use of the data provided in the selection and sizing of a silencer for a particular application. ESDU

N83-33096 ESDU International Ltd., London (England).
COMPRESSIBLE FLOW OF GASES: PRESSURE LOSSES AND DISCHARGE COEFFICIENTS OF ORIFICE PLATES, PERFORATED PLATES AND THICK ORIFICE PLATES IN DUCTS
Apr. 1982 35 p refs Sponsored by Royal Aeronautical Society, Institution of Chemical Engineers, and Institution of Mechanical Engineers
(ESDU-82009; ISBN-0-85679-387-6; ISSN-0141-4011) Avail: ESDU

This Data Item is an addition to the Fluid Mechanics Internal Flow Subseries. Pressure loss and discharge coefficient data for subsonic compressible flow of gases through single or multiple, sharp-edged orifices in thin or thick plates for flow rates up to choking are presented. The mechanics of compressible flow through orifices are discussed briefly with particular attention to sonic flow conditions. The mass flow function, based on orifice entry conditions, that gives maximum mass flow rate is presented and pressure loss coefficients are then expressed as a function of actual mass flow function to this limiting value. All are functions also of porosity and thickness/diameter ratio of the orifice. The data cover a range of porosity between 0.001 and 0.95 and thickness/diameter up to seven. ESDU

N83-33097 ESDU International Ltd., London (England).
PRESSURE LOSS AND HEAT TRANSFER FOR SINGLE-PHASE TURBULENT FLOW IN ROUGHENED CHANNELS: METHODS OF CALCULATION
Aug. 1982 34 p refs
(ESDU-82021; ISBN-0-85679-400-7; ISSN-0141-14011) Avail: ESDU

This Data Item is an addition to the Heat Transfer Subseries. Data and a simple method for the calculation of pressure loss and heat transfer for single-phase turbulent flow in channels subjected to uniform heat fluxes and uniform surface roughness on the shell-side or tube-side are provided. Surface roughening is one method that can be used to improve the ratio of heat transfer rating to heat exchanger size. The options available for the update or redesign of heat exchangers when roughened surfaces (roughness height up to 5% of the equivalent diameter) are used in place of smooth heat transfer surfaces are outlined. Available

heat transfer and pressure loss data for axial flow over roughened surface are correlated using a technique developed in the nuclear energy industry. Two simple semi-theoretical equations giving pressure loss and heat transfer are presented. The equations contain three empirical factors which account for roughness shape, roughness size and channel geometry. The data are applicable for turbulent flow at Reynolds numbers up to 10 to the 7th power and for both heating and cooling of gases and liquids in channels of various cross-sectional shapes. ESDU

N83-33098 ESDU International Ltd., London (England).
NON-NEWTONIAN FLUIDS: INTRODUCTION AND GUIDE TO CLASSIFICATION AND CHARACTERISTICS
Dec. 1982 26 p refs
(ESDU-82036; ISBN-0-85679-417-1; ISSN-0141-4011) Avail: ESDU

This Data Item is an addition to the Fluid Mechanics Internal Flow Subseries. The classification of non-Newtonian fluids according to their rheological behavior are considered. The characteristic shapes of the rheograms for various classes of fluid and the constitutive equations describing their behavior are presented. Examples of fluids in the various classifications are given and methods of measuring their characteristics are described. For the particular group of non-Newtonian fluids comprising solid particles suspended in a liquid medium, the settling behavior of the particles at zero or low flow velocities is discussed in terms of the basic behavior of well dispersed, uniform sized spherical particles and the effect on this behavior of nonspherical shapes, particle concentration, and nonuniform size. ESDU

N83-33099 Technische Physische Dienst TNO-TH, Delft (Netherlands). Afd. Fysische Optica.
VISUALIZATION OF BUBBLE IMPLOSIONS [VISUALISATIE BELIMPOSIES 1]
R. L. vanRenesse and H. J. Raterink 10 Dec. 1982 27 p refs In DUTCH
(Contract A82/KM/013)
(TPD-1982-0-3) Copyright. Avail: Issuing Activity

Bubbles in water were visualized in order to study the behavior of cavitations in a water flow close to a solid body and the erosion due to bubble implosions. The generation of bubbles with a pulsed laser facilitates the investigation of growth, implosion, and rebound behavior as a function of space and time. Experiments in which bubbles in stagnant water are generated with a focused pulsed laser beam are described. High speed cameras give an excellent first impression of the temporal cavitation behavior. The influence of a neighboring fixed wall is demonstrated. High speed film cameras are discussed. This technique is very well suited for studies in high velocity water tunnels. Author (ESA)

N83-33100*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
COMPUTER PROGRAM FOR SOLVING LAMINAR, TRANSITIONAL, OR TURBULENT COMPRESSIBLE BOUNDARY-LAYER EQUATIONS FOR TWO-DIMENSIONAL AND AXISYMMETRIC FLOW
Julius E. Harris and Doris K. Blanchard Feb. 1982 147 p refs
(NASA-TM-83207; NAS 1.15:83207) Avail: NTIS HC A07/MF A01 CSCL 20D

A numerical algorithm and computer program are presented for solving the laminar, transitional, or turbulent two dimensional or axisymmetric compressible boundary-layer equations for perfect-gas flows. The governing equations are solved by an iterative three-point implicit finite-difference procedure. The software, program VGBLP, is a modification of the approach presented in NASA TR R-368 and NASA TM X-2458, respectively. The major modifications are: (1) replacement of the fourth-order Runge-Kutta integration technique with a finite-difference procedure for numerically solving the equations required to initiate the parabolic marching procedure; (2) introduction of the Blottner variable-grid scheme; (3) implementation of an iteration scheme allowing the coupled system of equations to be converged to a specified accuracy level; and (4) inclusion of an iteration scheme for variable-entropy calculations. These modifications to the approach presented in NASA TR R-368 and NASA TM X-2458 yield a software package with high computational efficiency and flexibility. Turbulence-closure options include either two-layer eddy-viscosity or mixing-length models. Eddy conductivity is modeled as a function of eddy viscosity through a static turbulent Prandtl number formulation. Several options are provided for specifying the static turbulent Prandtl number. The transitional boundary layer is treated through a streamwise intermittency function which modifies the turbulence-closure model. This model is based on the probability distribution of turbulent spots and ranges from zero to unity for laminar and turbulent flow, respectively. Several test cases are presented as guides for potential users of the software. Author

N83-33101# Ballistic Research Labs., Aberdeen Proving Ground, Md. Fluid Physics Branch.
A PARAMETRIC STUDY OF MUZZLE BLAST
Edward M. Schmidt, E. J. Gion, and K. S. Fansler Dec. 1982 31 p refs Backup document for AIAA Synoptic, "Interaction of Gun Exhaust Flowfields", scheduled for publication in AIAA Journal in Mar. 1984
Avail: NTIS HC A03/MF A01

The muzzle flow properties of a 20mm cannon are measured for a range of launch velocities from 260 m/s through 1000 m/s. Sequential spark shadowgraphs are taken of the flowfield development. Pressure surveys are made in the blast ranging in distance from 0.2 m to 0.8 m from the muzzle. An idealized muzzle device is placed in the flow and surface pressure determined. Experimental results are compared with available theory. Author

N83-33102*# Case Western Reserve Univ., Cleveland, Ohio. Dept. of Mechanical and Aerospace Engineering.
USER'S MANUAL FOR THERMAL ANALYSIS PROGRAM OF AXIALLY GROOVED HEAT PIPE (HTGAP)
Yasuhiro Kamotani Sep. 1978 64 p refs
(Contract NAS5-24144)
(NASA-CR-170563; NAS 1.26:170563) Avail: NTIS HC A04/MF A01 CSCL 20D

A computer program that numerically predicts the steady state temperature distribution inside an axially grooved heat pipe wall for a given groove geometry and working fluid under various heat input and output modes is described. The program computes both evaporator and condenser film coefficients. The program is able to handle both axisymmetric and nonaxisymmetric heat transfer cases. Non-axisymmetric heat transfer results either from non-uniform input at the evaporator or non-uniform heat removal from the condenser, or from both. The presence of a liquid pool in the condenser region under one-g condition also causes non-axisymmetric heat transfer, and its effect on the pipe wall temperature distribution is included in the present program. The hydrodynamic aspect of an axially grooved heat pipe is studied in the Groove Analysis Program (GAP). The present thermal analysis program assumes that the GAP program (or other similar programs) is run first so that the heat transport limit and optimum fluid charge of the heat pipe are known a priori. Author

N83-33103*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A COMPARISON OF FLOW RATES AND PRESSURE PROFILES FOR N-SEQUENTIAL INLETS AND THREE RELATED SEAL CONFIGURATIONS
R. C. Hendricks 19 Aug. 1983 15 p refs Presented at Cryogen. Engr. Conf. and Intern. Cryogen. Mater. Conf., Colorado Springs, Colo., 15-19 Aug. 1983; sponsored by Cryogenics Engineering Conference/International Cryogenic Materials Conference and Dept. of Commerce and National Bureau of Standards
(NASA-TM-83442; E-1741; NAS 1.15:83442) Avail: NTIS HC A02/MF A01 CSCL 20D

Experimental and analytical results are presented for choked flows of fluid nitrogen over a range of reduced inlet stagnation temperatures (from 0.67 to ambient) and reduced inlet stagnation pressures to 2. Flow rate and pressure profile comparisons are made between N aligned sequential orifice inlets, a 33-tooth

labyrinth seal, a 3-step seal, a cylindrical seals and the classic venturi. Seal effectiveness appears strongly dependent on upstream losses and geometry configuration. Author

N83-33104# Cranfield Inst. of Tech., Bedfordshire (England). Aerodynamics Div.

A NOTE ON THE USE OF SURFACE PITOT TUBES FOR THE MEASUREMENT OF SKIN FRICTION IN LAMINAR BOUNDARY LAYERS

D. I. A. Poll Mar. 1983 9 p refs

(Rept-8307; ISBN-0-902937-82-0) Avail: NTIS HC A02/MF A01

A calibration is deduced for the measurement of skin friction by means of a small circular pitot tube attached to a surface. The analysis is primarily concerned with laminar boundary layer but limits are suggested for which the calibration is expected to be approximately valid for both laminar and turbulent flows. Author

N83-33105*# City Coll. of the City Univ. of New York. Dept. of Chemical Engineering.

NUMERICAL ANALYSIS OF TURBULENT COAXIAL FLOW WITH INTERNAL HEAT GENERATION

Avi Lin and Herbert Weinstein Jan. 1981 88 p refs

(Grant NsG-3174)

(NASA-CR-172633; NAS 1.26:172633) Avail: NTIS HC A05/MF A01 CSCL 20D

A computational method with which to obtain a physical understanding of the turbulent field of two coaxial jets entering an axisymmetric chamber is developed. Even the laminar field of this flow is quite complicated. This is due to the many different domains which exist in the field especially in the entrance region. Physically, three regions may be identified: the wall region, the initial region near the axis of symmetry and the mixing region. Advancing downstream, these regions change relative size with the ratio of the two jets' mass fluxes as the main parameter. The turbulent field of these flows is much more complicated due to the difference in the effective transport coefficients and turbulence level from region to region. However, being aware beforehand of the complications and the different regions of this field, the appropriate turbulence model and numerical scheme can be adjusted to treat the problem. S.L.

N83-33106# Defence Research Establishment, Ottawa. (Ontario). Energy Conversion Div.

A COMPUTER PROGRAM TO GENERATE THEORETICAL COHERENT ANTI-STOKES RAMAN SPECTRA (CARS)

T. Parameswaran (Ball (Roy) Associates Ltd.) and D. R. Snelling Jan. 1982 24 p refs

(AD-A128102; DREO-TN-81-18) Avail: NTIS HC A02/MF A01 CSCL 09/2

A computer code for generating and plotting theoretical CARS (Coherent Anti-Stokes Raman Spectroscopy) spectra is described. This code, which was obtained from Dr. A.C. Eckbreth of the United Technologies Research Center, was modified for use on a Sigma-9 computer. The theory and computational procedure involved in generating CARS spectra is discussed and the input parameters and variables used in the code are described. Theoretical nitrogen spectra, which are presented for a range of experimental conditions are discussed. GRA

N83-33107# MPB Technologies, Inc., Sainte-Anne-de-Bellevue (Quebec).

HEAT TRANSPORT WITH COLD AND HOT ELECTRONS ALLOWING FOR FLUX LIMITATION BY SHVARTS' METHOD

I. P. Shkarofsky Oct. 1982 30 p refs Presented at the 24th Am. Phys. Soc. Ann. Meeting, New Orleans, 1 Nov. 1982

(Contract DE-AC08-81DP-40162)

(DE83-003397; CONF-821128-2) Avail: NTIS HC A03/MF A01

The analysis of Shkarofsky is extended to include a variable degree of collisionality and gradient scale length using the method of Shvarts et al. The perturbed electron velocity distribution is limited in magnitude to the unperturbed part when the former becomes larger than the latter. A Maxwellian distribution is adopted for the hot electrons. The heat flow has coefficients proportional to gradients in cold and hot electron density, to gradients in cold and hot electron temperature and the free streaming contribution. These contributions are summed for two sample sets of scale lengths. One set of results shows that in an intermediate range of collisionality, the heat conduction and flux limiter are substantially decreased and the heat flow may even change direction. DOE

N83-33108# Sandia Labs., Livermore, Calif. Structural Mechanics Div.

TACO3D: A 3-DIMENSIONAL FINITE-ELEMENT HEAT-TRANSFER CODE

W. E. Mason Apr. 1983 93 p refs

(Contract DE-AC04-76DP-00789)

(DE83-011520; SAND-83-8212) Avail: NTIS HC A05/MF A01

A finite element computer code for the solution of nonlinear, three dimensional heat-transfer problems is discussed. The theory on which the code is based is outlined and the numerical-solution procedures are explained. The features and capabilities of the code are described. Instructions to enable the user to construct a data-input file and execute the code are provided. And, finally, examples illustrating the use of the code are given. DOE

N83-33109# California Univ., Livermore. Lawrence Livermore Lab. Office of the Unconventional Gas Recovery Program.

ONE-DIMENSIONAL FLUID-FLOW EXPERIMENTS

G. D. Anderson Mar. 1983 26 p refs

(Contract W-7405-eng-48)

(DE83-010262; UCID-19768) Avail: NTIS HC A03/MF A01

One dimensional fluid flow experiments were performed in which a viscous fluid is forced to flow down channels of uniform and varying thickness. The fluid used was glycerol. The rate of advance of the fluid down the channel, the fluid pressure as a function of time at the inlet and at three stations along the channel, and the fluid temperature were investigated. The purpose of the experiments was to provide experimental data for numerical code development. The experimental data from flow down a uniform channel agree, within the scatter of the data, with the results of simple analysis of one dimensional viscous flow. DOE

N83-33110# Argonne National Lab., Ill. Components Technology Div.

A 3-D SOLUTION OF FLOW IN AN INFINITE SQUARE ARRAY OF CIRCULAR TUBES BY USING BOUNDARY-FITTED COORDINATE SYSTEM

B. C.-J. Chen, T. H. Chien, W. T. Sha, and J. H. Kim (EPRI) 1982 8 p refs Presented at the Symp. of Numerical Generation of Curvilinear Coordinate Systems, Nashville, 16 Apr. 1982

(Contract W-31-109-eng-38)

(DE83-008887; CONF-820447-3) Avail: NTIS HC A02/MF A01

Heat transfer and fluid flow over circular tubes have wide applications in the design of heat exchangers and nuclear reactors. However, it is often difficult to accurately calculate the detailed velocity and temperature distributions of the flow because of the complex geometry involved in the analysis, and a lack of an appropriate coordinate system for the analysis. Boundary conditions on the surfaces of the tubes are often interpolated. This interpolation process introduces inaccuracy. To overcome this difficulty, the technique of the boundary-fitted coordinate system was used. In this technique, all the physical boundaries are transformed into constant coordinate lines in the transformed coordinates. Therefore, the boundary conditions can be specified on the grid points without interpolation. DOE

N83-33111# Laboratory for Electronic Development of the Armed Forces, Oegstgeest (Netherlands).

ANALYSIS AND DESIGN OF HYDRAULIC SERVOSYSTEMS WITHIN THE SCOPE OF THE IMPROVEMENT OF A FATIGUE TESTING INSTALLATION OF THE ROYAL ARMY

S. J. Uitterdijk 28 Sep. 1982 55 p refs In DUTCH; ENGLISH summary

(Contract A81/KL/031)

(LEOK-TR-1982-07; TDCK-77130) Avail: NTIS HC A04/MF A01

Linear hydraulic motors were studied and control systems

were developed and tested. A small-signal analysis of the principal behavior of a linear hydraulic motor is given by means of an equivalent scheme. The theory is verified on a pulsation installation for fatigue and vibration motor testing. The manner in which related control systems for symmetrical linear hydraulic motors, applied in various kinds of feedback, can be developed is described. Calculation of the amplification factor is explained. Author (ESA)

N83-33112# European Space Agency, Paris (France).
REPORT ON THE INFLUENCE OF BOUNDARY SURFACE FORCES AT THE BOUNDARIES OF LIQUID PHASES REGARDING PROCESSES OF LIQUID TRANSPORT UNDER ZERO GRAVITY CONDITIONS Final Report
Wolfgang Leiner, Bernd Schindler, and Peter-Juergen Sell Jun. 1983 113 p refs Transl. into ENGLISH of "Studie ueber den Einfluss von Grenzflaechenkraeften an fluiden Phasengrenzen im Hinblick auf Fluessigkeitstransportvorgaenge unter Schwerelosigkeit: Literaturstudie", Fraunhofer-Ges., Stuttgart Report BMFT-FB-W-77-19, Dec. 1977 Original report in GERMAN previously announced as N79-30527
(ESA-TT-576; BMFT-FB-W-77-19) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 23.10

Literature on boundary surface forces and their effects on liquid transport processes was reviewed as an aid in planning zero-gravity experiments in space. The physics of boundary surfaces, wetting, contact angle, spreading, immersion, sinter processes, zone melting and coalescence are discussed. It is shown that liquid flow phenomena at two phase boundary surfaces can be caused by gradients of the boundary surface energy and that at three phase lines flow is caused by the boundary surface forces themselves. Author (ESA)

N83-33113# Centro Informazioni Studi Esperienze, Milan (Italy). Documentation Service.
INTERNATIONAL HEAT PUMP CENTER OF THE INTERNATIONAL ENERGY AGENCY: SHORT, AND HALF TERM ACTIVITY OBJECTIVES [CENTRO INTERNAZIONALE SULLE POMPE DI CALORE DELL'AGENZIA INTERNAZIONALE DELL'ENERGIA: OBIETTIVI ED ATTIVITA' NEL BREVE E MEDIO TERMINE]
E. Piantoni and V. Recchi (OTB) 1983 19 p In ITALIAN Presented at Conv. FAST risparmio Energetico negli Edifici, Milan, 8 Jun. 1983 Sponsored by CNR
(CISE-2047) Avail: NTIS HC A02/MF A01

The main activities of the heat pump center are described. The goal of the center is to promote the technical and commercial development of heat pumps among the developed countries. The activities include news letters, data banks and reports. Author (ESA)

N83-33114# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
THIN FILM HEAT TRANSFER GAGE CONSTRUCTION AND MEASUREMENT DETAILS
P. M. Ligrani, C. Canci, and M. S. Grady Dec. 1982 83 p refs (VKI-TM-33) Avail: NTIS HC A05/MF A01

Thin-film heat transfer gage construction and measurement in a compression tube facility are discussed. A step-by-step outline for applying the gages on ceramic substrates is given. Stanton numbers versus Reynolds number based on downstream distance are shown for a thermal boundary layer developing on a flat plate in a zero pressure gradient at a freestream Mach number of 0.64. The experimental uncertainty of the Stanton number data based on a 20:1 confidence level is + or - 9.5%. The uncertainty on heat flux rate at the surface is + or - 8%. Author (ESA)

N83-33115# Centre National de la Recherche Scientifique, Meudon (France). Lab. d'Aerothermique.
TRANSPORT PHENOMENA. REACTIVE FLUIDS [PHENOMENES DE TRANSPORT. FLUIDES REACTIFS]
Roger Prud'homme May 1982 125 p refs In FRENCH Presented at Lecture Course on Etudes Approfondies de Phys. des Liquides, Paris, 1981-1982
(Rept-82-2; Publ-667; ISSN-0248-451-X) Avail: NTIS HC A06/MF A01

Equations of state; chemical kinetics; equilibrium equations; dimensionless numbers; and coupling are introduced. Turbulent flow; chemical reactors; boundary layers in the presence of chemical reactions and transport phenomena; and compressible fluids are discussed. Author (ESA)

N83-33116# Iowa Inst. of Hydraulic Research, Iowa City.
STUDY OF VERTICAL PLANE TURBULENT JETS AND PLUMES
B. R. Ramaprian and M. S. Chandrasekhara Mar. 1983 430 p refs
(Grants NSF ENG-77-27756; NSF CME-80-06797)
(PB83-190140; IIHR-257) Avail: NTIS HC A19/MF A01 CSCL 20D

Asymptotic, plane, vertical, turbulent plumes and nonbuoyant jets were studied. Simultaneous velocity and temperature were measured using frequency shifted, two component Laser Doppler anemometry (LDA), resistance thermometry and a high speed data acquisition system. Results obtained for two plumes with vastly different initial Richardson numbers indicate that both the plumes exhibit a nearly universal asymptotic behavior. The Richardson number of the asymptotic plume is a universal constant and is about 0.3. The mean velocity and temperature profiles in both jets and plumes are nearly Gaussian. It is found that turbulence levels in plumes are significantly higher than in jets. GRA

N83-33117# Massachusetts Inst. of Tech., Cambridge. Energy Lab.
INITIATION OF WATER HAMMER IN HORIZONTAL OR NEARLY-HORIZONTAL PIPES CONTAINING STEAM AND SUBCOOLED WATER Final Report
Feb. 1983 160 p refs Sponsored in part by Boston Edison Co. and Northeast Utilities Service Co.
(PB83-188250; MIT-EL-83-002) Avail: NTIS HC A08/MF A01 CSCL 20D

Water slug formation in a stratified countercurrent flow of steam and subcooled water in a horizontal or nearly horizontal pipe which traps a large steam bubble which then collapses rapidly and causes a water hammer is discussed. This water hammer initiating mechanism was studied. GRA

N83-33118# National Bureau of Standards, Washington, D.C. National Engineering Lab.
APPLICATION OF LASER-INDUCED RAYLEIGH LIGHT SCATTERING TO THE STUDY OF TURBULENT MIXING
William Pitts and Takashi Kashlwagi Feb. 1983 123 p refs
(PB83-183442; NBSIR-83-2641) Avail: NTIS HC A06/MF A01 CSCL 20D

This work describes the development and characterization of an experimental system employing laser-induced Rayleigh light scattering with digital data acquisition as a time-resolved, quantitative concentration probe in the turbulent flow field of a binary gas mixture. Author (GRA)

N83-32972 Polish Academy of Sciences, Warsaw.
DEPARTMENT OF FLUID MECHANICS
In its Sci. Activities of the Polish Acad. of Sci. 1983 p 44-48
(For primary document see N83-32969 21-31)
Avail: Issuing Activity

N83-33653# Nagoya Univ. (Japan). Dept. of Mechanical Engineering.
A STUDY ON THE FLUCTUATION CONCENTRATION FIELD IN A TURBULENT JET: ON THE MEASUREMENT OF THE CONCENTRATION FLUCTUATION INTENSITY AND THE SELF-PRESERVATION
Ikuo Nakamura, Yasuhiko Sakai, and Masafumi Miyata (Yamanasi Univ.) *In* Nagoya Univ. Mem. of the Fac. of Eng., Nagoya Univ., Vol. 34, No. 1 May 1982 p 113-124 refs (For primary document

see N83-33650 21-70)
Avail: NTIS HC A07/MF A01

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources.* For related information see also *06 Aircraft Instrumentation,* and *19 Spacecraft Instrumentation.*

N83-33119 ESDU International Ltd., London (England).
TEMPERATURE MEASUREMENT: THERMOCOUPLES
Nov. 1982 26 p refs
(ESDU-82035; ISBN-0-85679-416-3; ISSN-0141-14011) Avail: ESDU

This Data Item is an addition to the Heat Transfer Subseries. Background information and practical guidance on designing temperature measuring systems using thermocouples is provided. The nominal temperature range covered is -200 degrees C to 2000 degrees C but the comments apply, in general terms, to all thermocouple systems. The information is aimed at the user who wishes to design and install a practical thermocouple system using improved techniques that will allow temperatures to be measured within known tolerances. The selection, preparation, and installation of thermocouples, the use of compensating or extension cables, methods of referencing to a known temperature and measurement system are considered. The requirements for reliable systems operating to commercial tolerances are also described. Various factors that might impair the accuracy and stability of thermocouples are identified together with methods of reducing their effect. A check list for the design of a thermocouple system is given and a flow chart procedure for selecting appropriate thermocouple materials is provided as well. The employment of the techniques described will ensure that the temperature of the measuring junction is within known tolerances. ESDU

N83-33120 Technische Physische Dienst TNO-TH, Delft (Netherlands). Afd. Optiek.
HETERODYNE HOLOGRAPHIC INTERFEROMETRY
J. W. Burgmijer, H. J. Raterink, and P. vanZuylen 10 Dec. 1981 85 p refs In DUTCH; ENGLISH summary
(Contract A76/K/072)
(TPD-1981-0-4) Copyright. Avail: Issuing Activity

The sources of error of a heterodyne holographic interferometer for the determination of displacement and mechanical strain of an arbitrarily shaped object were investigated. Laser properties, rotating grating, interferometer, coherent imaging, photodetection and electronic phase measurement are discussed. The importance of a sufficient signal to noise ratio and signal level of the modulated detector output is shown. The accuracy of the phase measurements is limited by phase fluctuations due to refraction index fluctuations and mechanical drift. An automated system which measures phase differences between two neighboring points on the object is described. It is shown that the displacement and strain components can be measured using one hologram and three or five points of observation, with an accuracy of 10 nm and 1 microstrain. Interferometers with heterodyne phase detection are discussed. Author (ESA)

N83-33121 Centro Informazioni Studi Esperienze, Milan (Italy). Documentation Service.
THREE-DIMENSIONAL DEFECT IMAGING BY MULTI-FREQUENCY ACOUSTIC HOLOGRAPHY
M. Certo 1983 34 p refs Presented at OECD/IAEA Specialist Meeting on Defect Detection and Sizing, Ispra, Italy, 3-6 May 1983
(Contract ENEL-CISE-ISEA-2E/000)
(CISE-2034) Avail: NTIS HC A03

A multifrequency acoustical holography system was tested, using specimens with weld defects. The system automatically compensates for the divergence of the ultrasonic beam generated by the transducer, which brings about a lateral resolution slightly smaller than half the transducer side. It locates a defect independently of its geometric characteristics as well as of the exact knowledge of the transducer inclination angle since, within wide limits, the image reconstruction algorithm automatically takes into account the actual inclination. The acquisition and analysis times of the system restrict the technique to the phase of defect characterization. Times can be shortened by adopting analysis system based on array processors or on parallel processing. Author (ESA)

N83-33122 Institut d'Aeronomie Spatiale de Belgique, Brussels.
CONTROLLING THE 1ESO13 SPECTROMETER FOR SPACELAB AND ITS DATA RETRIEVAL
C. Lippens 1982 28 p refs Submitted for publication
(Aeronomica-Acta-A-252-1982) Avail: Issuing Activity

The command and data management system (CDMS) for Spacelab, its use to control the grille spectrometer, and handling of experiment data are described. Experiment 1ESO13 extensively uses the potential offered by the CDMS and crew presence, maintaining the possibility of operating the instrument without crew intervention. Control of the instruments is governed by a hierarchy of dedicated experiment processors which respond very quickly to external events. The Spacelab experiment computer is used for execution of the timeline, calculation of pointing direction and for display of crucial parameters. The crew can point the instrument at the Sun via their keyboard in case of experiment computer application software failure. Their principal task is to verify the wavelength calibration and find the corrections if necessary. The loop closed by the scientist in the payload operations control center user room is only used for replanning several hours in advance. Author (ESA)

N83-33123 Institut d'Aeronomie Spatiale de Belgique, Brussels.
SCIENTIFIC PROGRAMS FOR THE SPACELAB ESO13 GRILLE SPECTROMETER
C. Muller and J. Laurent (ONERA, Paris) 1983 23 p refs Submitted for publication
(Aeronomica-Acta-A-254-1983) Avail: Issuing Activity

The organization of spectral intervals and observation programs, and the reasons for the choices made for the first flight of the ESO13 infrared spectrometer are discussed. The spectrometer performs Earth limb observations in absorption during sunrise and sunset, and in emission from Spacelab. For sunset and sunrise, 12 successive altitude zones in which only 2 successive windows might be scanned are defined. Altitudes where light rays are tangent to a surface parallel to the Earth's surface are chosen, since most of the absorption takes place in this zone for a mixed constituent. In addition to multiplying the optical path by 70 compared to nadir, this permits a stable inversion of the data in terms of vertical distributions. The nominal flight altitude is 250 km, the upper limit of the first zone. In order to minimize the mechanical operation of the filter wheel and of the fast grating drive, spectral windows are changed only at the transitions of 200, 100 and 50 km. Scanning of two successive windows in the same zone is not adopted. Author (ESA)

N83-33124# Elven Precision Ltd., Crawley (England).
AN ALTERNATIVE SHAPE OF STRAIN-GAUGED BALANCE FOR USE IN WIND TUNNELS AT LOW TEMPERATURES
J. Y. G. Evans Aug. 1982 19 p refs Presented at the ETW Cryogenic Technol. Rev. Meeting, Amsterdam, 15-17 Sep. 1982
Avail: NTIS HC A02/MF A01

The search for a shape of one-piece balance that might be more suitable than the conventional strain-gauged balance for general use in low-temperature wind tunnels, led to a design with symmetry in both the pitch and yaw planes and with most of the drag stiffness concentrated at ne axial location. Calculations of stress levels and deflection under load showed this design to

have a performance similar to that of a modern conventional balance. Author

N83-33125# Rockwell International Corp., Golden, Colo. Energy Systems Group.
UTILIZATION OF AN AUTOMATED MULTIMETER CALIBRATION SYSTEM BY THE ROCKY FLATS STANDARDS LABORATORY
Barbara Wickoff, Robert S. Stand, Gerald R. Brown, Jr., G. A. Riordan, ed., and I. C. Delaney 10 Sep. 1982 53 p
(Contract DE-AC04-76DP-03533)
(RFP-3280) Avail: NTIS HC A04/MF A01

The time required to calibrate multimeters was reduced by 75%. Using the calibration system and programmed tape, a Fluke 8050A is calibrated in less than 1/2 hour compared to approximately 2 hours using conventional methods and standards. Most possible sources of human error introduced by recording the setting of instruments and errors from repetitive computations were eliminated. Author

N83-33126*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
RAINBOW SCHLIEREN
Walton L. Howes May 1983 21 p refs Original contains color illustrations
(NASA-TP-2166; E-1173; NAS 1.60:2166) Avail: NTIS HC A02/MF A01 CSCL 14B

The rainbow schlieren is an apparatus in which the usual schlieren knife edge cutoff is replaced by a radial rainbow filter with a transparent center and an opaque surround. With this apparatus most refractive index nonuniformities in the test section appear varicolored whereas uniformities appear white. The rainbow schlieren is simple, easy to use, and relatively inexpensive and gives much greater detail regarding nonuniformities than does the ordinary schlieren. Moreover, the rainbow schlieren permits quantitative evaluation of certain refractive index distributions, including those involving turbulence, by simple calculations. S.L.

N83-33127*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A NEW TECHNIQUE FOR MEASURING GAS CONVERSION FACTORS FOR HYDROCARBON MASS FLOWMETERS
Jag J. Singh and Danny R. Sprinkle Aug. 1983 15 p refs
(NASA-TM-85676; NAS 1.15:85676) Avail: NTIS HC A02/MF A01 CSCL 14B

A technique for measuring calibration conversion factors for hydrocarbon mass flowmeters was developed. It was applied to a widely used type of commercial thermal mass flowmeter for hydrocarbon gases. The values of conversion factors for two common hydrocarbons measured using this technique are in good agreement with the empirical values cited by the manufacturer. Similar agreements can be expected for all other hydrocarbons. The technique is based on Nernst theorem for matching the partial pressure of oxygen in the combustion product gases with that in normal air. It is simple, quick and relatively safe--particularly for toxic/poisonous hydrocarbons. Author

N83-33128*# Life Systems, Inc., Cleveland, Ohio.
INVESTIGATION OF THE APPLICABILITY OF USING THE TRIPLE REDUNDANT HYDROGEN SENSOR FOR METHANE SENSING Final Report
J. B. Lantz and R. A. Wynveen Apr. 1983 62 p refs
(Contract NAS9-16638)
(NASA-CR-171694; NAS 1.26:171694; LSI-TR-530-4) Avail: NTIS HC A04/MF A01 CSCL 14B

Application specifications for the methane sensor were assembled and design guidelines, development goals and evaluation criteria were formulated. This was done to provide a framework to evaluate sensor performance and any design adjustments to the preprototype sensor that could be required to provide methane sensitivity. Good response to hydrogen was experimentally established for four hydrogen sensor elements to be later evaluated for methane response. Prior results were assembled and analyzed for other prototype hydrogen sensor performance parameters to form a comparison base. The four sensor elements previously shown to have good hydrogen response were experimentally evaluated for methane response in 2.5% methane-in-air. No response was obtained for any of the elements, despite the high methane concentration used (50% of the Lower Flammability Limit). It was concluded that the preprototype sensing elements were insensitive to methane and were hydrogen specific. Alternative sensor operating conditions and hardware design changes were considered to provide methane sensitivity to the preprototype sensor, including a variety of different methane sensing techniques. Minor changes to the existing sensor elements, sensor geometry and operating conditions will not make the preprototype hydrogen sensor respond to methane. New sensor elements that will provide methane and hydrogen sensitivity require replacement of the existing thermistor type elements. Some hydrogen sensing characteristics of the modified sensor will be compromised (larger in situ calibration gas volume and H2 nonspecificity). The preprototype hydrogen sensor should be retained for hydrogen monitoring and a separate methane sensor should be developed. Author

N83-33129# Sandia Labs., Albuquerque, N. Mex.
THREE-DIMENSIONAL PROFILING WITH THE SANDIA NUCLEAR MICROPROBE
B. L. Doyle and N. D. Wing 1982 15 p refs Presented at the Conf. on Appl. of Accelerator in Res. and Ind., Denton, Tex., 8 Nov. 1982
(Contract DE-AC04-76DP-00789)
(DE83-002243; SAND-82-1552C; CONF-821123-3) Avail: NTIS HC A02/MF A01

A nuclear microprobe analysis system attached to Sandia's tandem Van de Graaff accelerator is described. A magnetic quadrupole doublet lens is used for the final focus and 2 micron beam diameters were obtained. Several illustrative applications of the microprobe, including the first three dimensional concentration profiles using Rutherford backscattering and elastic recoil detection ever measured, are given. DOE

N83-33130# California Univ., Berkeley. Lawrence Berkeley Lab.
SILICON RADIATION DETECTORS: MATERIALS AND APPLICATIONS
J. T. Walton and E. E. Haller Oct. 1982 21 p refs Presented at 6th Intern. Symp. on the Sci. Basis for Radioactive Waste Management, Boston, 1 Nov. 1982
(Contract DE-AC03-76SF-00098)
(DE83-003589; LBL-14909; CONF-821107-29) Avail: NTIS HC A02/MF A01

Silicon nuclear radiation detectors are available today in a large variety of sizes and types. This profusion was made possible by the ever increasing quality and diameter silicon single crystals, new processing technologies and techniques, and innovative detector design. The salient characteristics of the four basic detector groups, diffused junction, ion implanted, surface barrier, and lithium drift are reviewed along with the silicon crystal requirements. Results of crystal imperfections detected by lithium ion compensation are presented. Processing technologies and techniques are discussed, one in high energy particle track reconstruction and the other in X-ray angiography. The unique experimental results obtained with these devices are presented. DOE

N83-33131# Brookhaven National Lab., Upton, N. Y. NSLS Div.
DESIGN CONSIDERATIONS FOR AN X-RAY MICROPROBE
M. R. Howells and J. B. Hastings 1982 22 p refs Presented at the Intern. Conf. on X-Ray and VUV Synchrotron Radiation Instrumentation, Hamburg, 9-13 Aug. 1982
(Contract DE-AC02-76CH-00016)
(DE83-000976; BNL-31971; CONF-820839-4) Avail: NTIS HC A02/MF A01

The optical design of a fluorescent microprobe covering the X-ray region from 2 to 16 keV is considered for the X-ray ring.

The limit on detectability is from total flux (photons/sq microns) and several design choices are considered to match the optical system to the storage ring to maximize throughput. The tradeoffs in image quality and energy resolution of these designs was considered and within these constraints two firm proposals are presented. DOE

N83-33132# Los Alamos Scientific Lab., N. Mex. Physics Div.
STREAK CAMERA APERTURE FUNCTION
Douglas L. Dunbar 1983 7 p Presented at the Soc. of Photo-Opt. Instrumentation Engr. Conf., Santa Fe, N. Mex., 11-15 Apr. 1983 (Contract W-7405-eng-36)
(DE83-010088; LA-UR-83-810; CONF-830425-6) Avail: NTIS HC A02/MF A01

The temporal bandwidth of a multichannel streak camera was derived from scanning and Fourier theories is modeled. A multichannel streak camera system is described and the camera through the use of a transformation from the spatial to time domain. The image on the photocathode surface is transformed mathematically to the phosphor through the use of a convolution of the image and a moving aperture. The resulting image on the phosphor becomes a function of both space and time. A Fourier transform of this function gives both a spatial and temporal bandwidth of the tube. The model shows how to properly use the tube to obtain temporal data. DOE

N83-33133# Idaho National Engineering Lab., Idaho Falls.
DEVELOPMENT OF AN IMPROVED-CONTACT LIQUID-LEVEL PROBE FOR PRESSURIZED REACTOR VESSELS
P. V. Kelsey, Jr. Sep. 1982 96 p refs
(Contract DE-AC07-76ID-01570)
(DE83-008409; EGG-FM-5487) Avail: NTIS HC A05/MF A01

Electrical-conductivity-based probes for liquid level sensing show promise for pressurized water reactor environments, but have exhibited frequent bond failures at the ceramic/metal interfaces. A program to characterize and improve the interface behavior was completed successfully, and provided data for optimizing fabrication parameters, as well as general information on glass-to-metal bonding in a superalloy/silicate-glass system. The materials studied were Inconel X-750 and a barium silicate glass containing minor amounts of TiO_2, CeO_2, As_2O_3, Bi_2O_3, and Al_2O_3. DOE

N83-33134# National Aerospace Lab., Amsterdam (Netherlands). Spaceflight Div.
MEASUREMENT AND ANALYSIS OF GYRO NOISE
J. A. Bosgra and J. J. Reumers 26 Jan. 1983 25 p refs Presented at DGON Symp. on Gyro Technol., Stuttgart, Sep. 1981 Sponsored by ESTEC
(NLR-MP-81049-U) Avail: NTIS HC A02/MF A01

Noise was measured on two identical space-qualified gyroscopes of the floated rate-integrating type (Ferranti Type 125) in an analog rebalance-loop configuration of selectable loop bandwidth, running under space representative conditions in the frequency range 0.005 to 50 Hz. Results were processed into statistical parameters. Through a fast Fourier transform, auto and cross power spectra were determined together with auto and cross variance functions. Using transfer function polynomials, equivalent gyro open loop power spectra were computed from the closed loop results and compared with directly measured, open-loop spectra. The results allow a noise propagation analysis to be made when designing and analyzing satellite attitude-control systems with the Type 125 as a strapdown sensor. For systems using estimators and a combination of inertial and optical sensors, the results allow the derivation and application of a realistic noise model for this type of gyro. Author (ESA)

N83-33135# Stockholm Univ. (Sweden). Dept. of Physics.
A LEADING EDGE TIMING AND ENERGY DISCRIMINATOR
J. Becker and J. Litton (Karolinska Hospital, Sweden) Apr. 1983 10 p refs
(USIP-83-03) Avail: NTIS HC A02/MF A01

A single channel timing trigger was constructed using ECL integrated circuits. The discriminator was designed for positron emission tomography, to be placed close to the detectors in the gantry, eliminating the need to transmit fast pulses at low level over long cables. The discriminator generates a timing pulse that indicates the arrival of a photon with an accuracy of a few nanosec, and it examines the energy deposit of the photon, determining if it is above the energy threshold. The time information is extracted from the fast leading edge of the anode signal from a scintillator photomultiplier combination. The anode signal is also filtered through an alternate path. This signal is then used to check the energy criteria. Author (ESA)

N83-33136# Texas State Univ., Austin. Center for Transportation Research.
COMPARISON OF THE FALLING WEIGHT DEFLECTOMETER AND THE DYNAFLECT FOR PAVEMENT EVALUATION
Bary Eagleson, Scott Heisey, W. Ronald Hudson, Alvin H. Meyer, and Kenneth H. Stokoe Nov. 1982 163 p refs Sponsored in part by Texas State Dept. of Highways and Public Transportation
(PB83-184127; CTR-3-8-80-256-1; FHWA/TX-82/33) Avail: NTIS HC A08/MF A01 CSCL 14B

A literature search was made for the purpose of comparing deflection measuring devices. The Dynaflect, Road Rater, and Falling Weight Deflectometer (FWD) ranked highest when compared, using the criteria of cost, operational characteristics, and suitability. Field testing proved the Dynaflect and FWD were nearly equal in overall ability except in operational speed. Here the Dynaflect was superior primarily due to the automated sensor placement. The correlation coefficients obtained showed good agreement between the deflections measured by the two devices on all pavements tested except overlaid CRCP. This study indicates that there may be pavements and conditions for which the Dynaflect does not provide useful information or where present methods of data interpretation do not appear to be adequate. Author (GRA)

N83-33264# Meteorological Satellite Center, Tokyo (Japan).
RECEIVING AND MAGNETIC TAPE RECORDING OF ORIGINAL HRPT DATA
Toyoji Takayama *In its* Sum. of TOVS data Process. System Mar. 1983 p 11-24 refs In JAPANESE; ENGLISH summary (For primary document see N83-33262 21-42)
Avail: NTIS HC A08/MF A01

N83-33648# Kyoto Univ. (Japan). Dept. of Astronomy.
HYPERSENSITIZATION ON KODAK IIIa-J PLATES BY BAKING IN FORMING GAS
Toshiyuki Sasaki *In* Kyoto Univ. Mem. of the Fac. of Sci., Kyoto Univ., Ser. of Phys., Astrophys., Geophys. and Chem., Vol. 36, No. 2 Mar. 1983 p 343-351 refs (For primary document see N83-33643 21-70)
Avail: NTIS HC A09/MF A01

36 LASERS AND MASERS

Includes parametric amplifiers.

N83-33137*# National Aeronautics and Space Administration. Pasadena Office, Calif.
PORTABLE LASER REMOTE SYSTEM FOR METHANE GAS DETECTION Patent Application
William B. Grant (JPL, Pasadena, Calif.) and E. David Hinkley, Jr., inventors (to NASA) (JPL, Pasadena, Calif.) Filed 24 Sep. 1982 30 p Sponsored by NASA
(NASA-Case-NPO-15790-1; US-Patent-Appl-SN-423016) Avail: NTIS HC A03/MF A01 CSCL 20E

The transmitter for a portable system for the remote detection of methane gas leaks and concentrations includes two lasers, tuned respectively to a wavelength coincident with a strong absorption line of methane and a reference wavelength which is weakly absorbed by methane gas. The lasers are aimed at a topographical target along a system axis and the beams successively interrupted by a chopper wheel. The system receiver includes a spherical mirror for collecting the reflected laser radiation and

focusing the collected radiation through a narrowband optical filter onto an optical detector. The filter is tuned to the wavelength of the two lasers, and rejects background noise to substantially improve the signal-to-noise ratio of the detector. The output of the optical detector is processed by a lock-in detector synchronized to the chopper, and which measures the difference between the first wavelength signal and the reference wavelength signal. NASA

N83-33138*# RCA Labs., Princeton, N. J.
THE AlGaAs SINGLE-MODE STABILITY Final Report, 17 Jun. 1981 - 31 Jan. 1983
D. Botez and I. Ladany Aug. 1983 35 p refs
(Contract NAS1-15440)
(NASA-CR-3719; NAS 1.26:3719; RCA-PRRL-83-CR-7) Avail: NTIS HC A03/MF A01 CSCL 20E

Single-mode spectral behavior with aging in constricted double heterojunction (CDH) lasers was studied. The CDH lasers demonstrated excellent reliability (> or = 1 million years extrapolated room-temperature MTTF) and single-mode operation after 10,000 hours of 70 C aging. The deleterious effects of laser-fiber coupling on the spectra of the diodes were eliminated through the use of wedge-shaped fibers. A novel high-power large optical cavity (LOC)-type laser was developed: the terraced-heterostructure (TH)-LOC laser, which provides the highest power into a single-mode (i.e., 50 mW cw) ever reported. Author

N83-33139# Scientific Translation Service, Santa Barbara, Calif.
DIRECT INVESTIGATION OF THE ELIMINATION OF HYDROGEN CHLORIDE FROM 1,2-DICHLOROETHANE BY LASER-INDUCED RADICAL CHAIN REACTIONS Thesis
Matthias Schneider Oct. 1982 74 p refs Transl. into ENGLISH from Max Planck Inst. for Flow Research Rept. 21/1981, Gottingen, West Germany p 1-63
(Contract W-7405-eng-48)
(DE83-001411; UCRL-Trans-11803; Flow-Research-21/1981) Avail: NTIS HC A04/MF A01

The elimination of hydrogen chloride from 1,2-dichloroethane in a chain reaction was investigated in a flow reactor at T = 520 to 720 K and p = 60 to 600 torr. The chain was initiated by KrF laser photolysis of the dichloroethane. The temperature dependence of the UV absorption spectra of dichloroethane and of the products, vinyl chloride and hydrogen chloride was measured in the range from 300 to 770 K. At the photolysis wavelength of 248 nm (KrF) the absorption of dichloroethane increases by three orders of magnitude across this temperature interval. As the absorption cross section of vinyl chloride is more than an order of magnitude above that of the dichloroethane in the region about 215 nm, the formation of the product after the laser pulse can be followed with resolution in time by UV absorption measurement. It was possible to obtain from the measured signals, by means of an analytical expression, the rate constant k sub 3 for the unimolecular decomposition of 1,2-dichloroethane, which is the rate determining step for the chain reaction. DOE

N83-33140# California Univ., Livermore. Lawrence Livermore Lab. Physics Dept.
WAFER-SCALE LASER LITHOGRAPHY. I: PYROLYTIC DEPOSITION OF METAL MICROSTRUCTURES
Irving P. Herman, Roderick A. Hyde, Bruce M. McWilliams, Andrew H. Weisberg, and Lowell L. Wood 1982 11 p refs Presented at the 6th Intern. Symp. on the Sci. Basis for Radioactive Waste Management, Boston, 1-4 Nov. 1982
(Contract W-7405-eng-48)
(DE83-004220; UCRL-88314; CONF-821107-37) Avail: NTIS HC A02/MF A01

Mechanisms for laser driven pyrolytic deposition of micronscale metal structures on crystalline silicon were studied. Models were developed to predict temporal and spatial properties of laser induced pyrolytic deposition processes. An argon ion laser based apparatus was used to deposit metal by pyrolytic decomposition of metal alkyl and carbonyl compounds to evaluate the models. Implications for the high speed creation of micronscale metal structures in ultralarge scale integrated circuit systems are discussed. GRA

N83-33141# Los Alamos Scientific Lab., N. Mex.
LINAC TECHNOLOGY FOR FREE-ELECTRON LASERS
R. K. Cooper, P. L. Morton, P. B. Wilson, D. Keefe, and A. Faltens 1982 19 p refs Presented at the Free Electron Laser Conf., Bendor, France, 27 Sep. - 1 Oct. 1982 Sponsored in part by AF, DARPA, and Navy
(Contracts W-7405-eng-36; DE-AC03-76SF-00515; DE-AC03-76SF-00098)
(DE83-004740; LA-UR-82-3621; CONF-820988-4) Avail: NTIS HC A02/MF A01

The properties of high energy electron linear accelerators for use in free electron lasers operating principally in the Compton regime are discussed. Electron energies in the 20- to 200-MeV range and requirements for high power free electron lasers operating in the 0.5- to 10-micron range are emphasized. A motivational analysis that introduces the two principal types of linacs and indicates the utility of both for free electron laser work is presented. The accelerator and its design is an integral part of the free electron laser system, and not just a given entity around which laser designs must be based. High power free electron laser amplifiers and oscillators and desirable characteristics of the linacs that deliver electron beams for these devices are also discussed. DOE

N83-33142# California Univ., Livermore. Lawrence Livermore Lab. Special Studies "O" Group.
RESONANTLY-PUMPED SOFT-X-RAY LASERS USING ICF DRIVERS
Peter L. Hagelstein Dec. 1982 9 p refs Presented at the 6th Intern. Workshop on Laser Interaction and Related Plasma Phenomena, Monterey, Calif., 25-29 Oct. 1982
(Contract W-7405-eng-48)
(DE83-004305; UCRL-87122; CONF-821089-6) Avail: NTIS HC A02/MF A01

Some aspects of laser design relating to experiments planned for the NOVETTE laser system at Livermore in early 1983 are discussed. The experiments are aimed at testing several resonantly pumped lasers with transition energies between 42.3 eV and 153 eV. These experiments follow several years of theoretical work, a set of flashlamp characterization experiments performed on the SHIVA laser system in December, 1981, and some high precision spectroscopic studies carried out at KMS during the summer of 1982. Some of the major physics design issues as they relate to the experiments, and some of the numerical simulations that have been carried out so far are reviewed. DOE

N83-33143# KMS Fusion, Inc., Ann Arbor, Mich.
RECENT LASER FUSION EXPERIMENTS AT KMS
Donald C. Slater 1982 18 p refs Presented at the 9th Intern. Conf. on Plasma Phys. and Controlled Nucl. Fusion Res., Baltimore, 1 Sep. 1982
(Contract DE-AC08-82DP-40152)
(DE82-020324; KMSF-U-1266; CONF-820930-9) Avail: NTIS HC A02/MF A01

As part of the US Inertial Confinement Fusion program, KMSF conducts laser-target experiments that address specific issues of importance to the entire short-wavelength program. Spherical target irradiation experiments with the all-reflective, triple-bounce illumination system at 1.05 micrometers and 0.53 micrometers explored compression physics with cryogenic targets, and transport of energy by thermal and suprathermal electrons. These fully-integrated campaigns include the design of the experiments using KMSF-developed plasma and hydrocodes, target fabrication and characterization and subsequent theoretical modeling and interpretation of results. DOE

N83-33144# Los Alamos Scientific Lab., N. Mex.
USE OF LASERS AT THE LOS ALAMOS HOT-CELL FACILITY
Michael E. Lazarus 1983 8 p refs Presented at the Soc. of Photo-Optical Instrumentation Engr. Conf., Santa Fe, N. Mex.,

11-12 Apr. 1983
(Contract W-7405-eng-36)
(DE83-010087; LA-UR-83-804; CONF-830425-7) Avail: NTIS HC A02/MF A01

An optical profilometer that uses a Techmet LaserMike scanning, focused, laser beam, optical micrometer were installed in a remote alpha gamma containment cell. A hot cell extension chamber provides the nominal 30 cm working distance required by the LaserMike and, at the same time, keeps the LaserMike components outside the high radiation containment environment. This system provides measurement accuracy better than + or - 5 (SIGMA) m on diameters between 2 and 13 mm at a rate of 33 measurements per second. The Hot cell Facility also uses a Korad 20-J output ruby pulsed laser to drill a hole in reactor fuel element cladding to sample fission gas. The laser is used to reweld the hole so that the fuel element will not be contaminated and may be stored without an alpha containment barrier. The wall thickness of the fuel elements sampled varies from 0.25 to 0.50 mm. DOE

N83-33145# Bendix Corp., Kansas City, Mo.
LASER CUTTING PLASTICS Final Report
R. A. VanCleave Apr. 1983 20 p refs
(Contract DE-AC04-76DP-00613)
(DE83-011130; BDX-613-2906) Avail: NTIS HC A02/MF A01

Laser cutting and drilling various types of plastic and ceramic materials have been investigated. Nearly 100 different parts currently use laser technology as part of their production processes. A brief discussion of the 1000-W CO2-laser-development activities and typical production of parts is presented. The 1000-W CO2 laser proved to be a reliable, practical, and cost-effective machine tool. DOE

N83-33146# Los Alamos Scientific Lab., N. Mex.
BRIEF HISTORY OF THE LOS ALAMOS LASER PROGRAMS
Keith Boyer 1983 5 p Presented at the Soc. of Photo-Optical Instrumentation Engr. Conf., Santa Fe, N. Mex., 11-12 Apr. 1983
(Contract W-7405-eng-36)
(DE83-011135; LA-UR-83-1139; CONF-830425-15) Avail: NTIS HC A02/MF A01

The laser programs at Los Alamos began in 1969 to investigate the feasibility of laser-induced fusion. However, within a year they had been expanded to include a number of other applications including laser isotope separation. These programs now compose a substantial part of the Laboratory's research programs. DOE

N83-33147# Los Alamos Scientific Lab., N. Mex.
THE RF SYSTEM FOR THE LOS ALAMOS FREE-ELECTRON LASER (FEL)
Carl C. Friedrichs, Paul J. Tallerico, and William J. Hoffert 1983 4 p Presented at the Particle Accelerator Conf., Santa Fe, N. Mex., 21-23 Mar. 1983
(Contract W-7405-eng-36)
(DE83-009966; LA-UR-83-734) Avail: NTIS HC A02/MF A01

The FEL electron linac consists of three buncher cavities: two accelerator cavities and a deflection cavity, each with its own phase coherent of source. All sources will be pulsed for 10 (SIGMA)s at a 1 pps rate. The phase and amplitude stability requirements are + or 1/20, and + or - 1/2%. There are two subharmonic bunchers, each requiring 5 kW at 108.33 MHz. All remaining cavities operate at 1300 MHz. The fundamental buncher requires 5 kW, whereas each of the accelerating cavities requires at least 3 MW. The deflection cavity requires up to 100 kW, which is coupled from one of the accelerator cavity RF sources. Prominent features of the RF system are the phase and amplitude control circuits and the multimegawatt klystron amplifiers. Three L3707 klystrons were obtained from the AMRAD radar site at White Sands, which was decommissioned in the early 1970s. The tubes originally were designed to produce 10 MW, 10 (SIGMA)s pulses. Each tube has delivered over 3.6 MW, 100 (SIGMA)s pulses in the FEL system. DOE

N83-33148# Los Alamos Scientific Lab., N. Mex.
EVOLUTION OF LONG PULSES IN A TAPERED WIGGLER-FREE ELECTRON LASER
John C. Goldstein 1983 17 p refs Presented at the Soc. of Photo-Optical Instrumentation Engrs. Conf., Santa Fe, N. Mex., 11-15 Apr. 1983
(Contract W-7405-eng-36)
(DE83-011179; LA-UR-83-1224; CONF-830425-13) Avail: NTIS HC A02/MF A01

The evolution of a long pulse (pulse length much greater than the slippage distance) in a tapered wiggler free electron laser oscillator is studied by numerical solution of the one dimensional theoretical model for a realistic set of magnet, electron beam, and optical resonator parameter values. Single pass gain curves are calculated for low and high light intensities. It is found that an initial, low amplitude, incoherent pulse grows into a coherent pulse whose growth rate agrees with the calculated small signal gain curves. The transient evolution of coherent pulses is calculated for several different cavity length detunings, and a quasi-steady state desynchronism curve is obtained. Various pulse features for two points along the desynchronism curve are given. The frequency changing behavior (chirping) of the optical pulse during transient evolution is examined. DOE

N83-33149# Los Alamos Scientific Lab., N. Mex.
MULTIPLE-SCATTERING ANALYSIS OF LASER-BEAM PROPAGATION IN THE ATMOSPHERE AND THROUGH OBSCURANTS
A. Zardecki and S. A. W. Gerstl Jan. 1983 75 p refs Sponsored in part by Army Electronics Command
(Contract W-7405-eng-36; ASL Proj. 82-8003)
(DE83-008274; LA-9610-MS) Avail: NTIS HC A04/MF A01

The general purpose, discrete-ordinates transport code TWOTRAN is applied to describe the propagation and multiple scattering of a laser beam in a nonhomogeneous aerosol medium. For the medium composed of smoke, haze, and a rain cloud, the problem of the target detectability in a realistic atmospheric scenario is addressed and solved. The signals reflected from the target vs the signals scattered from the smoke cloud are analyzed as a function of the smoke concentration. By calculating the average intensity and a correction factor in the x-y and r-z geometries, the consistency of the rectangular and cylindrical geometry models is assessed. Received power for a detector with a small field of view is computed on a sphere of 1-km radius around the laser source for the Air Force Geophysics Laboratory rural aerosol model with extinction coefficients of 4 km(+1) and 10 km(+1). This computation allows one to study the received power as a functions of the angle between the detector and source axes. The correction factor describing the multiple-scattering enhancement with respect to the simple Lambert-Beer law is introduced. DOE

N83-33150# Los Alamos Scientific Lab., N. Mex.
SUBHARMONIC TRIPLE BUNCHER FOR A HIGH-EFFICIENCY FREE-ELECTRON LASER
J. S. Fraser 1983 4 p refs Presented at the Particle Accelerator Conf., Santa Fe, N. Mex., 21-23 Mar.1983
(Contract W-7405-eng-36)
(DE83-009957; LA-UR-83-706; CONF-830311-70) Avail: NTIS HC A02/MF A01

A high efficiency free electron laser oscillator experiment was constructed. A buncher system was designed to deliver 30-ps, 5-nC electron bunches to a 20-MeV standing wave linac at the 60th subharmonic of the 1300-MHz accelerator frequency. The first 108.3-MHz buncher cavity accepts a 5-ns, 5-A peak current pulse from a triode gun. Following a 120-cm drift space, a second 108.3-MHz cavity is used, primarily to enhance the bunching of the trailing half of the bunch. A 1300-MHz cavity with 20-cm drift spaces at each end completes the beamline components. The bunching process continues into the linac's first three accelerating cells. Two thin iron shielded lenses and seven large diameter solenoids provide axial magnetic fields for radial focusing. DOE

N83-33151# Brookhaven National Lab., Upton, N. Y. Physics Dept.
HIGH-ENERGY GAMMA-RAY BEAMS FROM COMPTON-BACKSCATTERED LASER LIGHT
A. M. Sandorfi, M. J. LeVine, C. E. Thorn, G. Giordano, and G. Matone 1983 6 p refs Presented at the Particle Accelerator Conf., Santa Fe, N. Mex., 21-23 Mar. 1983
(Contract DE-AC02-76CH-00016)
(DE83-010443; BNL-32874; CONF-830311-88) Avail: NTIS HC A02/MF A01

Collisions of light photons with relativistic electrons were previously used to produce polarized (BETA)-ray beams with modest resolution but relatively low intensity. The LEGS project (Laser + Electron Gamma Source) will produce a very high flux of background free polarized (BETA) rays whose energy will be determined to a high accuracy ((RADICAL)E = 2.3 MeV). The 300(420)-MeV (BETA) rays will be produced by backscattering UV light from the new 2.5(3.0)-GeV X-ray storage ring of the national synchrotron light source (NSLS). The LEGS facility will operate as one of many passive users of the NSLS. In a later stage of the project, a free electron laser is expected to extend the (BETA)-ray energy up to 700 MeV. DOE

N83-33152# Brookhaven National Lab., Upton, N. Y.
FREE ELECTRON LASER EXPERIMENT AT BROOKHAVEN
A. Luccio, C. Pellegrini, A. vanSteenbergen, and L. H. Yue 1982 7 p refs Presented at the Intern. Conf. on Lasers, New Orleans, 13-17 Dec. 1982
(Contract DE-AC02-76CH-00016)
(DE83-010160; BNL-32678; CONF-821203-4) Avail: NTIS HC A02/MF A01

The status of the free electron laser experiment is reported. The permanent magnet undulator is described. The gain measurement experiment is also described. DOE

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N83-33153 ESDU International Ltd., London (England).
DYNAMIC SEALING OF FLUIDS. PART 1: GUIDE TO SELECTION OF ROTARY SEALS
Sep. 1980 19 p refs Sponsored by Institution of Mechanical Engineers
(ESDU-80012-Pt-1; ISBN-0-85679-295-0; ISSN-0141-2590) Avail: ESDU

This Data Item is an addition to the Tribology Subseries. The general characteristics of the basic types of sealing devices which are suitable for predominantly rotary shaft motion are described. The data are useful during the initial stages of the design of a sealing arrangement consisting of a sealing device, housing, shaft, and associated features. Other ESDU data or manufacturers' information where appropriate, may have to be used to allow the sealing arrangement design to be finalized. Special arrangements, depending on the severity of the paticular problem, can be incorporated into the overall design to modify the sealing devices's local environment and/or to upgrade the overall performance. ESDU

N83-33154 ESDU International Ltd., London (England).
DESIGN OF DISC CAMS WITH SWINGING FLAT-FACED FOLLOWERS: CALCULATION METHODS
Aug. 1981 34 p refs Sponsored in part by the Institution of Mechanical Engineers
(ESDU-80021-Amend-A; ISBN-0-85679-305-1; ISSN-0141-4046) Avail: ESDU

This Data Item is an addition to the Mechanisms Subseries. The design of cam and follower systems is discussed. The dimensions of the reference circle, cutter arm offset and angle of swing, and the distance between centers must first be chosen and a suitable cam law selected. The flow charts provided may be used to calculate pressure angles, cam profile coordinates, cam radii of curvature, and cam profile cutting coordinates for every segment of the cam. The polar or rectangular form for the coordinates may be used. ESDU

N83-33155 ESDU International Ltd., London (England).
DESIGNING WITH ROLLING BEARINGS. PART 1: DESIGN CONSIDERATIONS IN ROLLING BEARING SELECTION WITH PARTICULAR REFERENCE TO SINGLE ROW RADICAL AND CYLINDRICAL ROLLER BEARINGS
May 1981 51 p refs Sponsored in part by the Institution of Mechanical Engineers
(ESDU-81005-Amend-A; ISBN-0-85679-330-2; ISSN-0141-2590) Avail: ESDU

This Data Item is an addition to the Tribology Subseries. The general characteristics of the most commonly used rolling bearings that are suitable for applications involving relative rotation between a shaft and housing are described. Assistance is given to designers during the initial stages of the design of a bearing arrangement consisting of two or more rolling bearings, a shaft and housing; preferred bearing arrangements are described in Appendix A. Guidance is given on specifying the design requirements for each individual bearing and, in particular, typical values of design life are quoted for common applications. Further, guidance is given on the use of life adjustment factors for more exacting applications. ESDU

N83-33156 ESDU International Ltd., London (England).
ATLAS OF PERFORMANCE CURVES FOR CRANK-ROCKER AND SLIDER-CRANK LINKAGES
Nov. 1981 409 p refs Sponsored by Institution of Mechanical Engineers
(ESDU-81033-Amend-A; ISBN-85679-365-5; ISSN-0141-4046) Avail: ESDU

This Data Item is an addition to the Mechanisms Subseries 59. An "atlas" of graph sheets is presented. It directly provides nine important performance parameters related to the motion of the crank for a set of linkages defined by the "lambda" parameters including: (1) angle between the coupler link and the line of centers; (2) angle between the rocker link and the line of centers; (3) angle between coupler and rocker (the transmission angle); (4) coupler velocity coefficient; (5) rocker velocity coefficient; (6) coupler acceleration coefficient; (7) rocker acceleration coefficient; (8) coupler end-load coefficient; (9) crank torque coefficient. The method covers all four bar linkages, including slider-crank, parallel-coupler and offset swinging-block. Each graph sheet includes a scale sketch of the linkage defined by the parameters. normalized to a base length of unity. Author

N83-33157 ESDU International Ltd., London (England).
DESIGNING WITH ROLLING BEARINGS. PART 2: SELECTION OF SINGLE ROW ANGULAR CONTACT BALL, TAPERED ROLLER AND SPHERICAL ROLER BEARINGS
Jun. 1982 67 p Sponsored by Inst. of Mechanical Engineers
(ESDU-81037-Pt-2-Amend-A; ISBN-0-85679-370-1; ISSN-0141-2590) Avail: ESDU

This Data Item is an addition to the Tribology Subseries. Design considerations in roller bearing selection are addressed in terms of those applications where a bearing arrangement consisting of a single row radial ball bearing and a single row cylindrical roller bearing is not suitable. Single row angular contact and four point ball bearings, single and double row tapered roller bearings and spherical roller bearings and spherical roller bearings are considered. Adjacent pairs of single row angular contact ball bearings and bearing units consisting of a four point ball bearing and a cyclindrical roller bearing mounted adjacent to each other are also considered. A general procedure for selection of the correct types and size of bearings are provided. The procedure includes flow charts for the selection of bearing type and size and data input tables and calculations sheets for specifying the design requirements and recording the results of the calculations involved. The operating characteristics of each bearing type are

dealt with and guidance is given on the avoidance of tribological problems or unnecessarily large bearings. Topics as internal clearance, bearing setting and preloading are discussed. Charts, which indicate the dimensions and load rating of the bearings considered are presented. Examples of typical bearing arrangements are described and equations and charts for the calculation of bearing loads and guidance on the choice of contact angle in opposed pair bearing arrangements are included. ESDU

N83-33158 ESDU International Ltd., London (England).
SELECTION OF DRD CAM LAWS
Mar. 1982 26 p refs Sponsored by Institution of Mechanical Engineers
(ESDU-82006; ISBN-0-85679-384-1; ISSN-0141-4046) Avail: ESDU

This Data Item is an addition to the Mechanisms Subseries. A method for selecting a cam law for a DRD motion segment in any cam mechanism, particularly for machine tool engineering, mining equipment, printing, packaging, textile, and special purpose machinery. The applicability range of the data includes all cam mechanism configurations. ESDU

N83-33159 ESDU International Ltd., London (England).
NESTED HELICAL COMPRESSION SPRINGS OF ROUND WIRE (TO BE USED IN CONJUNTION WITH DATA ITEM NO. 82008)
Aug. 1982 17 p
(ESDU-82012; ISBN-0-85679-397-3; ISSN-0141-4089) Avail: ESDU

This Data Item is an addition to the Stress and Strength Subseries. Data are provided in graphical form, for the design of helical compression springs acting in combination. The design process is applicable to either two or three springs arranged concentrically or just two springs arranged telescopically. Clearance between concentric springs is obtained using a clearance factor incorporated into the design equations, minor discrepancies produced between calculated and recommended clearances are discussed. Design notes on nested springs are provided and a shortened process explained in which an existing single spring design may be directly replaced with a nest to reduce either stress, length or outside diameter. Three worked examples are provided concerning the design of both types of nest. ESDU

N83-33160 ESDU International Ltd., London (England).
DESIGNING WITH ROLLING BEARINGS. PART 3: SPECIAL TYPES
Jun. 1982 23 p refs Sponsored in part by the Institution of Mechanical Engineers
(ESDU-82014; ISBN-0-85679-389-2; ISSN-0141-2590) Avail: ESDU

This Data Item is an addition to the Tribology Subseries. The third of a group of three reports dealing with design considerations in rolling bearing selection is intended to make the designer aware of some of the bearing types not fully covered in Parts 1 and 2. These bearings may allow the designer to meet more exacting requirements or may offer production and assembly advantages. Double row angular contact ball bearings, cylindrical roller bearings with ribs on both rings, multirow cylindrical roller bearings, split roller bearings, needle roller bearings high precision bearings, plummer blocks, bearings with housings take up units, airframe control bearings and rod end bearings are considered. The general characteristics of the bearings and their typical applications are described. Guidance is given where appropriate, on the calculation of equivalent loads and an appendix is included on the axial load carrying ability of cylindrical roller bearing with ribs on both rings. Charts are provided for selecting suitable dimensions of double row angular contact ball, caged needle roller and double row cylindrical roller bearings. ESDU

N83-33161 ESDU International Ltd., London (England).
THE ESTIMATION OF BASIC DIMENSIONS OF DISC CAMS WITH TRANSLATING FOLLOWERS
Sep 1982 24 p refs
(ESDU-82023; ISBN-0-85679-403-1; ISSN-0141-3988) Avail: ESDU

This Data Item is an addition to the Mechanisms Subseries. A method for the determination of the dimensions of a cam and translating follower configuration to suit a given application. The data are particularly applicable to machine tool engineering, automobile engineering, mining equipment, printing, packaging, textile, and special purpose machinery. The range of applicability includes any application with a rotating input motion requiring a translating output motion. ESDU

N83-33162 ESDU International Ltd., London (England).
A GUIDE TO THE SELECTION OF CAM AND FOLLOWER TYPE
Oct. 1982 14 p refs
(ESDU-82024; ISBN-0-85679-404-X; ISSN-0141-3988) Avail: ESDU

This Data Item is an addition to the Mechanisms Subseries. A method for the selection of a cam and follower configuration to suit a given application is provided. The data are particularly applicable to machine tool engineering, automobile engineering, mining equipment, printing, packaging, textile and special purpose machinery. The range of applicability includes any machinery. The range of applicability includes any application with a rotating input motion requiring either a translating or swinging output motion. ESDU

N83-33163 ESDU International Ltd., London (England).
CALCULATION METHODS FOR STEADILY LOADED FIXED-INCLINED-PAD THRUST BEARINGS
Nov. 1982 42 p
(ESDU-82029; ISBN-0-85679-410-4; ISSN-0141-2590) Avail: ESDU

This Data Item is an addition to the Tribology Subseries. Charts and calculation methods for the design of fixed inclined pad thrust bearings are provided. The bearings considered are steadily loaded with the load shared equally between the pads but applications with loads and speeds varying slowly may be treated by this method. The text is divided into two major parts. The first part of the text describes the operation of a fixed inclined pad thrust bearing, gives guidance on the specification of the design parameters and provides a method for estimating the required dimensions of the bearing. A method for analyzing the performance of a bearing design and calculated methods for determining the film thickness power loss, lubricant flow rates and temperatures are included. ESDU

N83-33164 ESDU International Ltd., London (England).
CALCULATION METHODS FOR STEADILY LOADED, OFF-SET PIVOT, TILTING-PAD THRUST BEARINGS
Mar. 1983 34 p ref
(ESDU-83004; ISBN-0-85679-423-6; ISSN-0141-2590) Avail: ESDU

This Data Item is an addition to the Tribology Subseries. Charts and calculation methods for the design of off set pivot, tilting pad thrust bearings are provided. The data may also be used to analyze the performance of existing bearing designs in failure analysis or to investigate the feasibility of uprating their performance. The bearings considered are steadily loaded with the load shared equally between the pads but applications with loads and speeds varying slowly may be treated by this method. The operation of an off set pivot, tilting pad thrust bearing, guidance on the specification of the design parameters and a method for estimating the required dimensions of the bearing are provided. A method for analyzing the performance of a bearing design and calculation methods for determining the resulting film thickness, power loss, lubricant flow rates and temperatures are also included. Guidance is given on modifying the performance and ensuring that the bearing operates with an adequate margin of safety. ESDU

N83-33165 ESDU International Ltd., London (England).
THE ESTIMATION OF BASIC DIMENSIONS OF DISK CAMS WITH SWINGING FOLLOWERS
May 1983 31 p refs

(ESDU-83008; ISBN-0-85679-428-7; ISSN-014-4046) Avail: ESDU

This Data Item is an addition to the Mechanisms Subseries. A method for the determination of the dimensions of a cam and swinging follower configuration to suit a given application is provided. The design method achieves minimum cam size by a consideration of follower load in the case of swinging roller followers, and contact stress in the case of swinging flat faced followers. The data are particularly applicable to machine tool engineering, automobile engineering, mining equipment, printing, packaging, textile, and special purpose machinery. The range of applicability includes any application with a rotating input motion requiring a swinging output motion. ESDU

N83-33166*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

EFFECT OF CARBIDE DISTRIBUTION ON ROLLING-ELEMENT FATIGUE LIFE OF AMS 5749

Richard J. Parker and Eric N. Bamberger (GE, Cincinnati) Aug. 1983 14 p refs

(NASA-TP-2189; E-1243; NAS 1.60:2189) Avail: NTIS HC A02/MF A01 CSCL 13I

Endurance tests with ball bearings made of corrosion resistant bearing steel which resulted in fatigue lives much lower than were predicted are discussed. Metallurgical analysis revealed an undesirable carbide distribution in the races. It was shown in accelerated fatigue tests in the RC rig that large, banded carbides can reduce rolling element fatigue life by a factor of approximately four. The early spalling failures on the bearing raceways are attributed to the large carbide size and banded distribution. E.A.K.

N83-33167*# Cincinnati Univ., Ohio. Dept. of Mechanical and Industrial Engineering.

GEOMETRICAL ANALYSIS OF CIRCULAR-CUT SPIRAL BEVEL GEARS Final Report

Ronald L. Huston Aug. 1983 59 p refs

(Grant NsG-3188)

(NASA-CR-168226; NAS 1.26:168226) Avail: NTIS HC A04/MF A01 CSCL 13I

Geometrical studies of circular cut spiral bevel gears are reported. Tooth profile changes heel to toe are studied in the transverse plane. Pressure angle changes are determined. The radiuses of curvature of the tooth surfaces generated by various cutter profiles are also determined. The consequences of cutter profile changes are explored. Crown gears are emphasized and the implications for conical gears are discussed. E.A.K.

N83-33168*# Santa Clara Univ., Calif.

AN ANALYTICAL INVESTIGATION OF NO SUB X CONTROL TECHNIQUES FOR METHANOL FUELED SPARK IGNITION ENGINES

L. H. Browning and L. A. Argenbright [1983] 8 p refs

(Grant NAG3-143)

(NASA-CR-172847; NAS 1.26:172847) Avail: NTIS HC A02/MF A01 CSCL 13I

A thermokinetic SI engine simulation was used to study the effects of simple nitrogen oxide control techniques on performance and emissions of a methanol fueled engine. As part of this simulation, a ring crevice storage model was formulated to predict UBF emissions. The study included spark retard, two methods of compression ratio increase and EGR. The study concludes that use of EGR in high turbulence, high compression engines will both maximize power and thermal efficiency while minimizing harmful exhaust pollutants. Author

N83-33169# Westinghouse Electric Corp., Golden, Colo. Advanced Systems Technology.

IMPROVED COMBUSTION-TURBINE EFFICIENCY WITH REFORMED-ALCOHOL FUELS

Donald G. Davies, Neil H. Woodley, Richard W. Foster-Pegg, and Michael E. Karpuk Jan. 1983 7 p refs Presented at the ASME 28th Intern. Gas Turbine Conf., Phoenix, Ariz., 27-31 Mar. 1983 Prepared in cooperation with Midwest Research Inst.

(Contracts DE-AC02-77CH-00178; EG-77-C-01-4042)

(DE83-005713; SERI/TP-235-1710; CONF-830309-2) Avail: NTIS HC A02/MF A01

A high efficiency, alcohol-burning combustion turbine system is described. The system's high efficiency is the result of an endothermic catalytic reforming of the alcohol fuel using exhaust gas waste heat. A performance analysis of a catalytic reformer for methanol, methanol/water, and ethanol/water mixtures is presented. System performance predictions for a 501D (100 MW/sub e/) combustion turbine show significant improvements in efficiency and power over distillate fuel and potential reductions in NO/sub x/ emissions. An economic comparison with distillate fuel indicates the time when a reformed alcohol combustion turbine could be feasible. DOE

N83-33170# Interpace Corp., LeRoy, N.Y.

EXPLOSION-RESISTANT BUSHINGS FOR GAS-INSULATED EQUIPMENT Final Report

J. H. Moran Dec. 1982 57 p Sponsored by EPRI

(EPRI Proj. 1423-1)

(DE83-901152; EPRI-EL-2788) Avail: NTIS HC A04/MF A01

An explosion resistant bushing for use in gas insulated equipment was developed. The intent was to eliminate some inherent problems of oil containing bushings when used in gas insulated apparatus. Even with a solid cast resin bushing construction whose cores contains to oil itself, a dielectric material is required to fill up the space between the core and the porcelain shell. If oil is used for this purpose, even a small amount of oil leaking into the gas section of the apparatus would degrade the overall performance substantially. Therefore, the design objectives included methods to eliminate all need for oil. The oil was successfully eliminated from the design by substituting a semisolid, polymeric compound whose electrical and thermal characteristics could be tailored to the requirements of the proposed application. A bushing so constructed is indistinguishable from an oil filled unit insofar as any physical or electrical properties are concerned. DOE

N83-33171# Southwest Research Inst., San Antonio, Tex.

METALLURGICAL EVALUATION OF A FAILED LP-TURBINE DISC Final Report

H. C. Burghard, Jr. Dec. 1982 84 p refs Sponsored by EPRI

(EPRI Proj. 1398-6)

(DE83-901100; EPRI-NP-2738) Avail: NTIS HC A05/MF A01

A metallurgical evaluation of a burst disc from the LP turbine at the Yankee Rowe nuclear generating station was performed. The turbine failure incident involves catastrophic rupture of both No. 1 discs during a start-up. The objectives of the evaluation were to characterize the disc materials and identify the cracking mechanism and other metallurgical factors involved in the failure. Metallographic and fractographic examinations of one segment of the No. 1 generator-end disc were performed. The mechanical properties and composition of the disc segment were also determined. The investigation established that the radial fracture in the disc segment initiated at a service-induced crack and was of a generally brittle character. Also, numerous subcritical cracks were observed in the bore surface. DOE

N83-33172# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.

ARC PHYSICS AND HEAT FLOW IN GAS TUNGSTEN ARC WELDING

J. F. Key, H. B. Smartt, J. W. Chan, and M. E. McIlwain (GeoCenters, Inc., Newton Upper Falls, Mass.) 1982 20 p refs Presented at the Welding Technol. Conf., Hobart, Tasmania, Australia, 10 Oct. 1982

(Contract DE-AC07-76ID-01570)

(DE83-003727; EGG-M-12082; CONF-821099-1) Avail: NTIS HC A02/MF A01

Work to determine interrelationships of heat source, molten pool, and weld bead geometry is described and the sensitivity of these interrelationships to welding variables is discussed. The effects on bead morphology of changing current, welding speed,

and filler wire speed, with practical boundaries, are presented as multivariable plot. A model of the relationship between process parameters and weld bead morphology is presented; the model involves dynamic heat and mass balances in a control volume containing the molten pool. GRA

N83-33173# Curtiss-Wright Corp., Wood-Ridge, N.J. Power Systems Div.
HIGH TEMPERATURE TURBINE TECHNOLOGY PROGRAM. PHASE 2: TECHNOLOGY TEST AND SUPPORT STUDIES Technical Progress Report, 1 Oct. - 31 Dec. 1982
Feb. 1983 14 p
(Contract DE-AC01-76ET-10348)
(DE83-008933; CW-WR-76-020.115; FE-2291-115) Avail: NTIS HC A02/MF A01

This report presents the status of work performed on the High Temperature Turbine Technology Program, Phase II Technology Test and Support Studies during the fourth quarter of 1982, October 1 through December 31, 1982. The objective of this effort is to evaluate the level of aerodynamic losses associated with a transpiration air-cooled airfoil and with a solid uncooled airfoil of identical profile. All work was completed in this period. This report discusses the calibration of the traversing probe, the completion of the Topical Report and the completion of the extended oxidation testing on mesh alloys. DOE

N83-33174# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.
FOULING OF A FINNED-TUBE HEAT EXCHANGER IN THE EXHAUST OF A STATIONARY DIESEL ENGINE Final Report
S. P. Henslee and J. L. Bogue Mar. 1983 86 p refs
(Contract DE-AC07-76ID-01570)
(DE83-012089; EGG-FM-6189) Avail: NTIS HC A05/MF A01

A subscale finned-tube heat exchanger was operated on the exhaust stack of a 1.5 MW stationary diesel engine to determine the heat-transfer degradation due to fouling and corrosion. Transient behavior of the overall heat-transfer coefficient, fouling resistance, and calculated pressure drop are reported, as well as physical observations of the foulant deposited on the finned surface. Near-asymptotic fouling behavior was observed after 200 hours of operating time. DOE

N83-33175# SRI International Corp., Menlo Park, Calif.
SCALE-MODEL TESTS OF TURBINE MISSILE CONTAINMENT BY REINFORCED CONCRETE Final Report
C. M. Romander and A. I. Florence Mar. 1983 201 p refs
(EPRI Proj. 399-2)
(DE83-901977; EPRI-NP-2747) Avail: NTIS HC A10/MF A01

Twenty-five impact tests were performed on 1/11-scale models of reinforced-concrete walls. The objective of these tests was to determine experimentally the threshoid velocity at which postulated turbine missiles perforate reinforced-concrete walls, such as the containment structures and auxiliary plant structures, found in typical pressurized-water-reactor (PWR) plants. Four scale model reinforced-concrete targets and three scale-model turbine missiles were used in the tests. The four targets represent 4.5- and 3.5-ft-thick, heavily reinforced containment walls with steel liners; a 3-ft-thick, lightly reinforced containment wall backed up by a separate steel plate; and a 2-ft-thick, lightly reinforced control room wall. The three 1/11-scale turbine missiles model a 3250-lb missile, a 4000-lb missile, and an 8300-lb missile. The missiles were propelled at velocities from 130 ft/s up to 700 ft/s to strike the target in a piercing orientation (sharp edge impacting), a blunt orientation (broad edge impacting), and a glancing-blow orientation (piercing orientation at 450 to the target). Test results are presented. DOE

N83-33176# Jones (J. A.) Applied Research Co., Charlotte, N.C.
REPEATABILITY OF TREES ROTOR BORE INSPECTION SYSTEM
F. V. Ammirato Nov. 1982 73 p Sponsored by EPRI
(EPRI Proj. 1570-2)
(DE83-900739; EPRI-NP-2640) Avail: NTIS HC A04/MF A01

The repeatability of near bore flaw detection and sizing of the turbine rotor examination and evaluation system (TREES) developed was examined by making many repeat scans of sample blocks containing fatigue cracks and embedded spherical and disk shaped flaws of various sizes. Comparison data were collected manually using the bore ultrasonic characterization system (BUCS). It is shown that TREES consistently detects flaws in the near bore region. TREES determined the radial extent of flaws with associated standard deviations of 18% for fatigue cracks, 30% for embedded disk shaped reflectors. Corresponding BUCS measurements show larger measurement spreads in each flaw classification. DOE

N83-33177# SRI International Corp., Menlo Park, Calif.
SCALE-MODEL TURBINE-MISSILE-CASING IMPACT TESTS Final Report
C. M. Romander and A. I. Florence Jan. 1983 103 p refs Sponsored by Electric Power Research Inst.
(EPRI Proj. 399-2)
(DE83-901487; EPRI-NP-2742) Avail: NTIS HC A06/MF A01

Three 1/5-scale model turbine missle impact experiments are described in this report. These experiments were performed by SRI in support of the EPRI program to provide bench mark data for assessing turbine missile effects in nuclear plant design. The objective of the SRI experiments was to demonstrate the applicability of scaling in turbine missile impact of steel casing structures by comparing the results of the 1/5-scale tests with comparable full-scale tests performed by Sandia Laboratories. In the scale model experiments, geometric scaling was used where dimensions are reduced by the scale factor while materials, stresses, strains, and velocities remain the same as in the prototype. An explosive launcher was developed to accelerate the 1/5-scale models of a turbine missile to the desired impact velocities. The results of the scale model experiments agreed well with the results of the full-scale experiments and were sufficient to demonstrate scalability. DOE

N83-33178# Sandia Labs., Albuquerque, N. Mex.
DEVELOPMENT OF AN ICE-PENETRATING MODEL
M. M. Hightower, F. R. Norwood, and C. W. Young Dec. 1982 46 p refs
(Contract DE-AC04-76DP-00789)
(DE83-007316; SAND-82-0599) Avail: NTIS HC A03/MF A01

A program to evaluate various analytical methods to predict penetrator motion during normal impact into ice is discussed. A constitutive equation for ice was deduced from existing material property data and an ice penetration model was developed. This model was used to calculate penetrator performance and loading for several ice penetration tests. These calculations were then compared to the experimental data. DOE

N83-33179# Centre de Recherches Scientifiques et Techniques de l'Industrie des Fabrications Metalliques, Brussels (Belgium). Section: Construction Metallique.
STEEL FRAMEWORK COUPLING BASED ON DOWELLING TECHNIQUE [ASSEMBLAGES DE CHARPENTE METALLIQUE BASES SUR LA TECHNIQUE DU GOUJONNAGE]
Rene Maquoi (Liege Univ.), Xavier Naveau, and Jacques Rondal (Liege Univ.) May 1983 71 p refs In FRENCH; ENGLISH summary Sponsored by Inst. pour l'Encouragement de la Recherche Scientifique dans l'Industrie et l'Agriculture and CIDECT (CRIF-MT-152) Avail: NTIS HC A04/MF A01

The use of threaded stud shear connectors for framing connections between beams and columns was studied, especially for hollow columns. Determination of the welding parameters for the threaded connectors; tensile and shear tests on welded studs and on simple connection models; and tests on beam-column assemblies with a square hollow section for the column and an open profile section for the beam (OP) are described. End plates were welded on the OP section, or else the assembly had angles connecting either the beam web or the beam flanges to the wall of the column. A design method similar to that used for bolted connections was derived. Author (ESA)

N83-32714# Vereinigte Flugtechnische Werke G.m.b.H., Bremen (West Germany). Metallisches Werkstoffe.
ECONOMIC RIVETING [WIRTSCHAFTLICHES NIETEN]
K. Hoffer and R. Meier *In its* Develop. and Demonstration of Econ. Production Systems in Airframe Construct. Sep. 1982 p 84-126 In GERMAN (For primary document see N83-32709 21-01)
Avail: NTIS HC A10/MF A01

N83-32715# Vereinigte Flugtechnische Werke G.m.b.H., Bremen (West Germany). Metallische Werkstoffe.
WELDING OF COMPONENTS MADE OF THE ALUMINUM CAST ALLOY A357 [SCHWEISSEN VON BAUTEILEN AUS DER AL-GUSSLEGIERUNG A357]
G. Neye and A. Kolley *In its* Develop. and Demonstration of Econ. Production Systems in Airframe Construct. Sep. 1982 p 127-159 In GERMAN (For primary document see N83-32709 21-01)
Avail: NTIS HC A10/MF A01

N83-32974 Polish Academy of Sciences, Warsaw.
DEPARTMENT OF MECHANICAL SYSTEMS
In its Sci. Activities of the Polish Acad. of Sci. 1983 p 55-61 (For primary document see N83-32969 21-31)
Avail: Issuing Activity

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N83-33180*# Cleveland State Univ., Ohio. Coll. of Engineering.
THE EFFECT OF STRESS ON ULTRASONIC PULSES IN FIBER REINFORCED COMPOSITES Final Report
John H. Hemann and George Y. Baaklini Washington NASA Aug. 1983 80 p refs
(Grant NAG3-106)
(NASA-CR-3724; NAS 1.26:3724) Avail: NTIS HC A05/MF A01 CSCL 20K

An acoustical-ultrasonic technique was used to demonstrate relationships existing between changes in attenuation of stress waves and tensile stress for an eight ply 0 degree graphite-epoxy fiber reinforced composite. All tests were conducted in the linear range of the material for which no mechanical or macroscopic damage was evident. Changes in attenuation were measured as a function of tensile stress in the frequency domain and in the time domain. Stress wave propagation in these specimens was dispersive, i.e., the wave speed depends on frequency. Wave speeds varied from 267 400 cm/sec to 680 000 cm/sec as the frequency of the signal was varied from 150 kHz to 1.9 MHz which strongly suggests that flexural/lamb wave modes of propagation exist. The magnitude of the attenuation changes depended strongly on tensile stress. It was further observed that the wave speeds increased slightly for all tested frequencies as the stress was increased. Author

N83-33181*# Informatics General Corp., Palo Alto, Calif.
GUIDELINES FOR SOFTWARE INSPECTIONS
Aug. 1983 116 p refs
(Contract NAS2-11555)
(NASA-CR-166521; NAS 1.26:166521) Avail: NTIS HC A06/MF A01 CSCL 14D

Quality control inspections are software problem finding procedures which provide defect removal as well as improvements in software functionality, maintenance, quality, and development and testing methodology is discussed. The many side benefits include education, documentation, training, and scheduling. E.A.K.

N83-33182*# Pratt and Whitney Aircraft Group, East Hartford, Conn.
SENSOR FAILURE DETECTION FOR JET ENGINES Final Report
E. C. Beattie, R. F. LaPrad, M. M. Akhter (Systems Control Technology), and S. M. Rock (Systems Control Technology) May 1983 152 p refs
(Contract NAS3-23282)
(NASA-CR-168190; NAS 1.26:168190; PWA-5891-18) Avail: NTIS HC A08/MF A01 CSCL 14D

Revisions to the advanced sensor failure detection, isolation, and accommodation (DIA) algorithm, developed under the sensor failure detection system program were studied to eliminate the steady state errors due to estimation filter biases. Three algorithm revisions were formulated and one revision for detailed evaluation was chosen. The selected version modifies the DIA algorithm to feedback the actual sensor outputs to the integral portion of the control for the nofailure case. In case of a failure, the estimates of the failed sensor output is fed back to the integral portion. The estimator outputs are fed back to the linear regulator portion of the control all the time. The revised algorithm is evaluated and compared to the baseline algorithm developed previously. E.A.K.

N83-33183# Wisconsin Univ., Madison. Dept. of Statistics.
SENSITIVITY AND ASYMPTOTIC PROPERTIES OF BAYESIAN RELIABILITY ESTIMATES
Bernard Harris and Andrew P. Soms May 1982 25 p refs
(Contracts N00014-79-C-0321; DAAG29-80-C-0041)
(AD-A128216; TR-672) Avail: NTIS HC A02/MF A01 CSCL 12/1

In decision theoretic approaches to estimation problems, loss functions of the type (theta cap theta) = determinant theta-cap theta determinant to the alpha power, alpha greater than 0) are often employed, often alpha = 2. In many applications of reliability and life testing, such loss functions are inappropriate. Alternative loss functions which appear to be more suited to the intended application are proposed and Bayesian estimates of the exponential parameter are obtained for these. Asymptotic expansions of such estimators are given and compared with estimators given in the literature. Author (GRA)

N83-33184# Centro Informazioni Studi Esperienze, Milan (Italy). Documentation Service.
AN IMPROVED ALGORITHM FOR THE SIMULATION OF THE ULTRASONIC INSPECTION PROCESS
M. Certo 1983 25 p refs Presented at OECD/IAEA Specialist Meeting on Defect Detection and Sizing, Ispra, Italy, 3-6 May 1983
(Contract ENEL-CISE-ISEA-2E/000)
(CISE-2035) Avail: NTIS HC A02/MF A01

An algorithmic approach for the development of a code fit for the simulation of the ultrasonic dispersion process is described. The code can operate in the transducer near field region. The code runs on an IBM 4341 computer. Computing time to get the ultrasonic response depends on defect size, inclination and position compared with the transducer and varies from a few sec (typically for far field defects with small inclinations) to 1 to 2 min.
Author (ESA)

N83-33185# Centro Informazioni Studi Esperienze, Milan (Italy). Documentation Service.
ULTRASONIC SPECTROSCOPY AND SIGNAL PROCESSING FOR DEFECT LOCATION AND SIZING IN HEAVY SECTIONS
G. Redondi 1983 25 p refs Presented at OECD/IAEA Specialist Meeting on Defect Detection and Sizing, Ispra, Italy, 3-6 May 1983
(Contract ENEL-CISE-ISEA-2E/000)
(CISE-2036) Avail: NTIS HC A02/MF A01

An apparatus able to acquire, record and analyze echo signals, in the time and frequency domains was designed and constructed. The apparatus, based on a desk top computer, can perform ultrasonic spectroscopy analyses related to defect characterization, material microstructure characterization, and bonded joints inspection. Measurements carried out on artificial and real defects, in laboratory and on industrial components, show

that echo time duration is a useful parameter for planar defect sizing. Exploitation of information in order to discriminate, characterize and size different types of defects is only possible using automatic analysis procedures, such as those based on pattern recognition techniques. Author (ESA)

N83-32982 Polish Academy of Sciences, Warsaw.
DEPARTMENT OF NON-DESTRUCTIVE TESTING
In its Sci. Activities of the Polish Acad. of Sci. 1983 p 118-121
(For primary document see N83-32969 21-31)
Avail: Issuing Activity

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

N83-33186 Louisiana State Univ., Baton Rouge.
A FINITE ELEMENT ANALYSIS OF HIGH TEMPERATURE FATIGUE AND CREEP AT A STRESS CONCENTRATION Ph.D. Thesis
Faysal Abdou Kolkailah 1982 216 p
Avail: Univ. Microfilms Order No. DA8229506

The Bodner-Partom model of nonlinear time dependent material behavior was incorporated into a finite element code to predict the strain response at the notch root of an Inconel 718 specimen subjected to cyclic tension-compression at 649 C. A numerical minimization technique was developed to establish the parameters in the Bodner-Partom model. This technique was applied to creep and stress strain data obtained from buttonhead test specimens tested at 649 C. These parameters were found to be in general close agreement with those obtained by other investigators. The test specimen for the experimental phase was double notched with an elastic stress concentration factor of 1.94. It was subjected to cyclic plastic loads at 649 C which were large enough to generate plastic deformation at the notch root on the tensile portion of the cycle. This behavior was then predicted by incorporating the Bodner-Parton model into a finite element code. Dissert. Abstr.

N83-33187 California Univ., Berkeley.
SOLUTION STRATEGIES FOR STATICALLY LOADED NONLINEAR STRUCTURES Ph.D. Thesis
Jeffrey William Simons 1982 102 p
Avail: Univ. Microfilms Order No. DA8300657

An investigation of solution strategies was undertaken, with the aim of developing a scheme which is reliable and substantially automatic for a wide variety of statically loaded nonlinear structures. The concepts of scalar force, scalar displacement and scalar stiffness are defined, and the use of rank-one stiffness and flexibility modifications is described. Next, a framework for nonlinear static solution strategies is developed, based on Newton-Raphson iteration. This framework consists of four computational tasks, namely linearization, displacement prediction, state determination, and convergence checking. Currently available solution strategies are shown to differ in the way particular tasks are performed. The strategies considered include modified Newton methods, Quasi-Newton methods, displacement-controlled iteration, techniques for variable load step selection, and event-to-event strategies. Finally, a general solution strategy is described that includes most existing schemes, plus certain new schemes as options. This strategy permits analysis by either load-controlled or displacement controlled methods, with flexibility in the choice for the controlling parameters. Dissert. Abstr.

N83-33188 Northwestern Univ., Evanston, Ill.
NUMERICAL ANALYSIS OF FAST FRACTURE PROBLEMS IN ELASTIC-PLASTIC SOLIDS Ph.D. Thesis
Hungkuang Gregory Chung 1982 157 p
Avail: Univ. Microfilms Order No. DA8225895

The fields of stress and deformation near a rapidly propagation crack tip in an elasto-plastic material were investigated. Both Mode I and Mode III fracture cases were considered. The incremental theory of plasticity was used, and finite difference techniques were employed to solve the system of governing equations. A method based on the previous plastic strains and the current total strains was used, with the relation between equivalent stress and equivalent strain, to compute the current state of plastic deformation. No iteration was needed to satisfy the Von Mises yield function, except for the case of plane-stress. A kinematic hardening model was extended to determine the plastic state when reverse plastic loading occurs. For small-scale yielding the case of anti-plane deformation with quasi-static Model III crack growth was investigated. It was found that the near tip stress field is strongly affected by the grid size, because of the presence of a singularity at the crack tip. The finite difference method was found to be relatively inefficient. In addition, dynamic crack growth in a rectangular strip with a crack in its center-plane y - 0 was investigated. Dissert. Abstr.

N83-33189 Stanford Univ., Calif.
TECHNIQUES IN OPTIMUM STRUCTURAL SYNTHESIS WITH STATIC AND DYNAMIC CONSTRAINTS Ph.D. Thesis
Prabhat Hajela 1982 143 p
Avail: Univ. Microfilms Order No. DA8301220

A general class of nonlinear programming, gradient based numerical procedures for optimal structural design is emphasized. A design variable linking strategy is presented that adaptively reduces a large dimension optimal synthesis problem to a sequence of one dimensional searches. This controlled growth approach is based on a constraint proposition that allows the user to represent a very large number of inequality constraints by a single cumulative measure. The cumulative constraint formulation is also extended to a multilevel design approach for sizing redundant truss structures for strength and buckling constraints. This approach incorporates a hybrid search involving a nonlinear programming algorithm at the system level and a state space type optimal solution at the component level. The methodology developed is applied to a class of flutter constrained design problems. The cumulative constraint formulation affords a single constraint on the design to exclude flutter from the flight regime. In this approach, analytical gradients of the generalized flutter constraint can be computed in an elegant manner. Dissert. Abstr.

N83-33190 ESDU International Ltd., London (England).
ELASTIC STRESSES IN THE ADHESIVE IN SINGLE STEP DOUBLE LAP BONDED JOINTS
Aug. 1980 10 p refs Sponsored by the Royal Aeronautical Society
(ESDU-80011; ISBN-0-85679-294-2; ISSN-0141-4097) Avail: ESDU

This Data Item is an addition to the Structure Subseries. Curves are presented which enable the peak elastic stresses to be determined in the adhesives in single step, double lap bonded joints loaded in tension or compression. The data cover a wide, practical range of joint sizes and adhesive and adherend materials properties in non-dimensional form. Typically they may be applied to thin bonded joints in aircraft wing, fuselage and furnishing components. B.W.

N83-33191 ESDU International Ltd., London (England).
THE STABILITY AND RESPONSE OF LINEAR SYSTEMS. PART V: CONTROL OF DYNAMIC SYSTEMS: AMENDMENT A
Jul. 1981 53 p refs Sponsored by the Royal Aeronautical Society
(ESDU-80018-Pt-5-Amend-A; ISBN-0-85679-301-9; ISSN-0141-3988) Avail: ESDU

This Data Item is an addition to the Dynamics Subseries. The function of the different system elements and the design techniques used to construct a system with the required characteristics are discussed. Proceeding from the essential first step of the definition

in a mathematical form of the plant to be controlled, the means by which the control of the plant may be enhanced by the application and limitation of different control elements is considered. Once the control strategy is chosen, a consideration of the changes that are necessary within the system to achieve the required performance is made. The conclusion discusses the overall effects and consequences of the successful control policy. ESDU

N83-33192 ESDU International Ltd., London (England).
ELASTIC STRESS CONCENTRATION FACTORS: SINGLE REINFORCED AND UNREINFORCED HOLES IN INFINITE PLATES OF ISOTROPIC MATERIALS
Oct. 1980 41 p Sponsored in part by the Royal Aeronautical Society, Inst. of Mechanical Engineers, and Inst. of Structural Engineers
(ESDU-80027; ISBN-0-85679-311-6; ISSN-0141-4089; ISSN-0144-2805; ISSN-0141-3996; ISSN-0141-4097) Avail: ESDU

This Data Item is an addition to the Stress and Strength Subseries Engineering Structures Subseries, Fatigue Subseries and to the Structures Subseries. Data on the stress concentrations that occur around circular, elliptical, square or rectangular holes in flat plates under various combinations of loads in the plane of the plate are presented. Data are also provided on the stress concentration when uniform section reinforcement is provided around the perimeter of the hole. For robust reinforcement around circular holes the stress concentrations at both the hole boundary and at the plate reinforcement the critical concentration is that associated with the plate to reinforcement junction and this alone is provided. Data on the approximate equivalent symmetric area of unsymmetric reinforcement are provided together with notes and examples on their application to assessing the stress concentration in practical structures. ESDU

N83-33193 ESDU International Ltd., London (England).
FATIGUE STRENGTH OF LARGE STEEL BOLTS AND THREADED CONNECTIONS UNDER AXIAL LOADING
Oct. 1980 9 p refs Sponsored by Institution of Mechanical Engineers
(ESDU-80028; ISBN-0-85679-310-8; ISSN-0141-4089) Avail: ESDU

This Data Item is an addition to the Stress and Strength Subseries. The results of 251 tests on threaded assemblies in which the nominal thread diameter was equal to, or greater than, 1.5 inches (38 mm) are given. Of these tests 160 were on simple nut and bolt assemblies and 91 were on a variety of configurations. The data are presented as SN-curves. The results of the simple nut and bolt assemblies were analyzed to show the dramatic variation in fatigue strength resulting from various manufacturing techniques. The remaining tests were on the larger threads (pitches from 2.25 mm (0.09 in) to 1:B 12.7 mm (0.5 in). These showed relative low fatigue strength when compared with threads less than 25 mm (1.0 in) nominal diameter. ESDU

N83-33194 ESDU International Ltd., London (England).
BUCKLING OF OUTSTANDING FLANGES DIRECT STRESSES VARYING LINEARLY OR PARABOLICALLY
Nov. 1980 7 p Sponsored in part by the Royal Aeronautical Society and the Institution of Structural Engineers
(ESDU-80035; ISBN-0-85679-318-3; ISSN-0144-2805; ISSN-0141-4097) Avail: ESDU

This Data Item is an addition to the Engineering Structures and to the Structures Subseries. Data on the buckling of outstanding flanges subjected to stresses which vary linearly or parabolically across their width are given. The buckling stresses are given for long thin rectangular plates in which one of the long edges is elastically restrained against rotation and the other is free and in which both ends perpendicular to the loading are simple supported. The data presented are strictly only applicable to cases where the stress and its distribution across the section remain constant along the length of the outstanding flange and are therefore not applicable to external loading distributions which diffuse rapidly into the outstanding flanges. ESDU

N83-33195 ESDU International Ltd., London (England).
USE OF LINEAR ELASTIC FRACTURE MECHANICS IN ESTIMATING FATIGUE CRACK GROWTH RATES AND RESIDUAL STRENGTH OF COMPONENTS
Nov. 1980 21 p refs Supersedes ESDU-76019 Sponsored by the Royal Aeronautical Society and Institution of Mechanical Engineers and Institution of Structural Engineers
(ESDU-80036; ISBN-0-85679-319-1; ISSN-0141-3996; ISSN-0141-4089; ISSN-0144-2805) Avail: ESDU

This Data Item is an addition to the Stress and Strength Subseries, Engineering Structures Subseries, and to the Fatigue Subseries. The concepts of linear elastic fracture mechanics are discussed as well as how these concepts may be used for analyzing the behavior of cracked structures under fatigue or static loadings. The analytical method, based upon the stress intensity factor is discussed as well as the equations and limitations of usage. It is shown how the stress intensity factor, K, which characterizes the stress distribution in the vicinity of the crack tip, can be used to correlate crack propagation rate data. Static failure (fracture toughness) and residual strength of materials under conditions where gross yielding does not occur are described. Details of how solutions of K may be obtained are discussed together with the effect of plasticity at the crack tip. ESDU

N83-33196 ESDU International Ltd., London (England).
ELASTIC ADHESIVE STRESSES IN MULTISTEP LAP JOINTS LOADED IN TENSION (COMPUTER PROGRAM)
Dec. 1980 57 p Sponsored by the Royal Aeronautical Society
(ESDU-80039; ISBN-0-85679-322-1; ISSN-0141-4097) Avail: ESDU

This Data Item is an addition to the Structures Subseries. A computer program is presented for the analysis of the distribution of the elastic shear and direct (normal) stresses in the adhesive which bonds lap joints of multistep configuration loaded in tension. The program allows for dissimilar adherends of symmetric (double lap) or asymmetric (single lap) configuration, assuming that the properties of the adhesive and the adherends are elastic. It takes account of the effect of bending in the joint and adjacent material but ignores local stress concentrations in the adherends. Part 1 gives guidance on the application of the program, instructions for use and examples of results to be expected including details of comparative proving tests that have been run. Part 2 gives program listing in FORTRAN IV and BASIC with supporting information on the theoretical derivation, program operational requirements and an order form for the card or tape copies. B.W.

N83-33197 ESDU International Ltd., London (England).
FATIGUE STRENGTH IN BENDING OF STEEL I-BEAMS WITH WELDED ATTACHMENTS
Aug. 1981 15 p refs Sponsored in part by the Institution of Mechanical Engineers
(ESDU-81007; ISBN-0-85679-332-9; ISSN-0141-4089; ISSN-0144-2805) Avail: ESDU

This Data Item is an addition to the Stress and Strength Subseries, and to the Engineering Structures Subseries. Data are provided on the fatigue strength of structural steel I-beams with welded cover plates or stiffening gussets between web and flange. Sketches of the configurations to which the data apply are presented showing the location of failures. The data are applicable to a wide range of steels and section geometries enduring constant emplitude bending loading for between 10,000 and 10 to the 8th power cycles. The effects of residual stress, mean stress, joint size, weld geometry, and weld grinding are included. Also provided are notes on the effects of cover plate geometry, end weld types, and different attachment methods for gussets. ESDU

N83-33198 ESDU International Ltd., London (England).
THE STABILITY AND RESPONSE OF LINEAR SYSTEMS. PART 6: SELECTION OF AN ASSESSMENT METHOD, AMENDMENT A
Jul. 1982 13 p
(ESDU-81008-Amend-A; ISBN-0-85679-333-7; ISSN-0141-3988) Avail: ESDU

this Data Item is an addition to the Dynamics Subseries. Part six of an integrated group that deal with the design of linear systems is pretended. The factors that, in particular, affect the selection of a specific method of system assessment are considered. An explanation of how an initial method of system assessment is chosen, and subsequently how this choice changes the system is designed is given. The advantages and disadvantages of the root and logrithmic/polar frequency response methods are detailed. ESDU

N83-33199 ESDU International Ltd., London (England).
FATIGUE CRACK PROPAGATION IN LOW AND MEDIUM STRENGTH LOW ALLOY STEEL PLATE, BAR AND FORGINGS
May 1981 17 p refs Sponsored by Inst. of Mechanical Engineers
(ESDU-81011; ISBN-0-85679-336-1; ISSN-0144-2805; ISSN-0141-4089) Avail: ESDU

This Data Item is an addition to the Stress and Strength Subseries, and to the Engineering Structure Subseries. Constant amplitude fatigue crack propagation rate data are provided for a wide range of low and medium strength low alloy steels in the form of plate, bar and forgings. The ultimate tensile strength of the materials is less than 850 MN/sq m and their thicknesses range from 5 to 76 mm. The data are derived from tests conducted in laboratory air at room temperature and mean da/dN curves are presented in terms of the stress intensity factor range and the 0.2% proof stress of the material. Curves are drawn either side of the mean curve that indicate limits of scatter of 90% of the data. The range of da/dN covered is from 10 to minus 5th power m/cycle to 10 to minus 9th power m/cycle. The effect of variations in mean stress, specimen size and thickness, and material yield strength are discussed. Details of all the materials and types of test specimen are tabulated and summary da/dN curves that compare the different groups of materials are given. ESDU

N83-33200 ESDU International Ltd., London (England).
THRESHOLD STRESS INTENSITY FACTORS AND SLOW FATIGUE CRACK PROPAGATION RATES IN LOW AND MEDIUM STRENGTH LOW ALLOY STEEL
Jun. 1981 18 p refs Sponsored by Institution of Mechanical Engineers
(ESDU-81012; ISBN-0-85679-337-X; ISSN-0141-4089; ISSN-0144-2805) Avail: ESDU

This Data Item is an addition to the Stress and Strength Subseries, and to the Engineering Structures Sub-series. Constant amplitude fatigue crack propagation rate (da/dN) data are provided for a wide range of low and medium strength steels in the form of plate and a forging. The ultimate tensile strength of the materials is less than 850 MN/sq m and their thicknesses range from 5 to 70 mm. The data were derived from tests conducted in laboratory air at room temperature and mean da/dN curves are presented in terms of the stress intensity factor range (delta K) and the stress ratio, R. The materials are grouped according to four ranges of their 0.2% proof stress and where possible the upper limit of scatter of the data is also provided. The range of da/dN covered is from 10 to the 8th power m/cycle down to the fatigue threshold factor, delta K sub TH, at 2 x 10 to the -11th power m/cycle. The effect of variations in mean stress, specimen size and thickness, and material yield strength is discussed. Details of all the materials and types of test specimen are tabulated and summary da/dN curves that compare the different groups of materials are given. Curves showing the effect of variations in the value of R at delta K sub TH for the various materials are also presented. Simple worked examples illustrate how the data may be used in practice. ESDU

N83-33201 ESDU International Ltd., London (England).
LATTICE STRUCTURES. PART 1: MEAN FLUID FORCES ON SINGLE AND MULTIPLE PLANE FRAMES
Oct. 1981 45 p refs Supersedes ESDU-75011
(ESDU-81027-Pt-1-Amend-A; ESDU-75011; ISBN-0-85679-361-2; ISSN-0141-4003) Avail: ESDU

This data item is an addition to the Wind Engineering Subseries. Data giving the mean force coefficients for plane lattice frames of conventional geometry are provided. The data are applicable to the calculation of wind loading (or other fluid loading) on lattice support structures for cable and pipe runs and sign gantries and on multiple frame structures in unclad building frames, roof structures and simple bridges. The data apply for frames of flat faced or tubular members (smooth or rough surfaces) and allow for the effect of ancillaries such as gusset plates, ladders, cables, and meshes. The effects of yaw and incidence of the flow can be accounted for as can the effects of shielding in multiple lattice frames. Data for solidity ratios from 0 to 1 are given and for tubular members the effect of Reynolds number is quantified. Guidance is also provided for tapered frames and frames of mixed number sections in both uniform and shear flow. Data for tower like lattice structures are provided in ESDU 81028. ESDU

N83-33202 ESDU International Ltd., London (England).
LATTICE STRUCTURES. PART 2: MEAN FLUID FORCES ON TOWER-LIKE SPACE FRAMES
Nov. 1981 49 p refs Supersedes ESDU-75011
(ESDU-81028-Pt-2-Amend-A; ESDU-75011; ISBN-0-85679-379-5; ISSN-0141-4003) Avail: ESDU

This Data Item is an addition to the Wind Engineering Subseries. Data for estimating the mean wind (or other fluid) forces and moments on spatial lattice structures such as towers are provided for application in the design of tower-like lattice structures such as communication towers, pylons, and masts. The data are also applicable to other types of spatial frames such as crane jibs, gantries and lattice booms but only when normal to the flow. Comprehensive data are provided for space frames of triangular, square or rectangular arrangements of the mean chord (leg) members for flow incidence from 0 deg to 360 deg. For tubular members, means of accounting for Reynolds numbers and surface roughness affects are included. The effect of adding ancillaries to the space frame are accounted for separately. ESDU

N83-33203 ESDU International Ltd., London (England).
FATIGUE CRACK PROPAGATION RATES AND THRESHOLD STRESS INTENSITY FACTOR RANGES FOR ALUMINUM ALLOY PLATE, EXTRUDED BAR AND FORGINGS
Nov. 1981 38 p refs Supersedes ESDU-75029 Sponsored by the Royal Aeronautical Society
(ESDU-81031; ESDU-75029; ISBN-0-85679-366-3; ISSN-0141-3996) Avail: ESDU

This Data Item is an addition to the Fatigue Subseries. Constant amplitude fatigue crack propagation rate (da/dN) data are provided for several aluminum alloys commonly used in the aerospace industry, in the form of plate, extruded bar and forgings. The data derived from tests conducted in laboratory air at room temperature and mean da/dN curves are presented in terms of the stress intensity factor range (delta K) and the stress ratio, R. Where possible curves representing the upper limit of 95% of the data are also provided. The ranges of da/dN covered are from .001 m/cycle down to the fatigue threshold factor range delta K sub TH at da/dN = 10 to the minus 11th power m/cycle. The effects of variations in the stress ratio R, test piece thickness, grain flow, heat treatment and environment are discussed. ESDU

N83-33204 ESDU International Ltd., London (England).
UNDAMPED NATURAL VIBRATION OF CORE BUILDINGS
Nov. 1981 46 p Sponsored in part by The Royal Aeronautical Society, Institution of Chemical Engineers, Institution of Mechanical Engineers and Institution of Structural Engineers
(ESDU-81036; ISBN-0-85679-369-8; ISSN-0307-4003) Avail: ESDU

This Data Item is an addition to the Wind Engineering Subseries. Estimates of frequency, mode shape, generalized mass and generalized stiffness for the undamped natural modes of vibration of core buildings are provided. The data are particularly applicable in estimation of the response of buildings to wind or earthquake loading. Shear effects in the core and rotatory inertia of the floors are included in the analysis, and the foundations are modeled by an equivalent rotational spring. By suitable choice of

parameters, the method may allow other cantilever-type structures such as chimneys or tall lattice towers to be investigated.
ESDU

N83-33205 ESDU International Ltd., London (England).
ELASTIC STRESSES AND DEFLECTIONS OF HELICAL COMPRESSION AND TENSION SPRINGS OF ROUND WIRE
May 1982 28 p refs Supersedes ESDU-65005 Sponsored by Institution of Mechanical Engineers
(ESDU-82008; ESDU-65005; ISBN-0-85679-386-8; ISSN-0141-4089) Avail: ESDU

This Data Item is an addition to the stress and strength Sub-series. Data are provided for the design of helical springs, and are presented wherever possible in graphical form for ease of use. Compression spring end forms and tension spring hooks are described with their effect on solid length characteristics, load/deflection behavior, etc. The stresses induced under axial, transverse or dynamic loading may be determined and damping data are provided for springs that are surging. Buckling characteristics are presented for various end constraint conditions and for both pivoted and nonpivoted seatings. Helix wrapping and diameter increase under compression are covered. Comprehensive worked examples of compression and tension spring design are presented.
ESDU

N83-33206 ESDU International Ltd., London (England).
FATIGUE CRACK PROPAGATION RATES AND THRESHOLD STRESS INTENSITY FACTOR RANGES FOR TITANIUM ALLOY PLATE, BAR AND FORGINGS
May 1982 36 p refs Sponsored in part by the Royal Aeronautical Soc.
(ESDU-82015; ISBN-0-85679-391-4; ISSN-0141-3996) Avail: ESDU

This Data Item is an addition to the Fatigue Sub-series. Constant amplitude fatigue crack propagation rate (da/dN) data are provided for several titanium alloys commonly used in the aerospace industry in the form of plate, bar and forgings. The data were derived from tests conducted in laboratory air at room temperature and mean da/dN curves are presented in terms of the stress intensity factor range (delta K) and the stress ratio R. Where possible the upper limit of scatter of the data is also provided. The range of da/dN covered is from 0.0001 m/cycle down to the fatigue threshold factor, delta K sub TH at da/dN = 10 to -11th power m/cycle. The effect of variations in the stress ratio plate thickness, grain flow, heat treatment and microstructure is discussed. There are particular references to the effects of texture, grain size and dwell time. Details of all the alloys and types of test specimens are tabulated and summary da/dN curves that compare the performance of the different alloys are given. Curves showing the effect of variations in the value of R at delta K sub TH for the various alloys are also presented. A simple worked example illustrates how the data may be used in practice.
ESDU

N83-33207 ESDU International Ltd., London (England).
UNDAMPED NATURAL VIBRATION OF SWAY FRAME BUILDINGS AND FRAME STRUCTURES, PART ISSUE
Aug. 1982 101 p refs
(ESDU-82019-Part-Issue; ISBN-0-85679-398-1; ISSN-0141-4003) Avail: ESDU

This Data Item is an addition to the Wind Engineering Subseries. Frequency, mode shape, generalized mass and generalized stiffness for the undamped natural modes of vibration of rectangular sway frame buildings and other frame structures that may be modeled as plane frames are estimated. The data are particularly applicable in the estimation of the response of buildings and frame structures to wind or earthquake loading. The range of applicability includes lateral sway modes of vibration of frame structures.
ESDU

N83-33208 ESDU International Ltd., London (England).
FAILURE MODES OF FIBRE REINFORCED LAMINATES
Oct. 1982 12 p
(ESDU-82025; ISBN-0-85679-405-8; ISSN-0141-4097) Avail: ESDU

This data item is an addition to the structures Subseries. This report is the first of a group providing the designer with guidance on the methods currently available of assessing the likelihood of fracture in fiber reinforced laminates. The more complex behavior of such composites, when compared to usual metallic materials, requires an appreciation of the modes in which failure may occur before quantitative strength assessments can be made. Guidance is provided on the current knowledge of these modes for laminates comprised of continuous fiber reinforced layers. The failure modes for individual layers in the laminate under simple loading are first dealt with and they are then related to the behavior of multidirectional (layer) laminates under simple and complex loading. The modes are presented in a clear tabular form supported by notes, examples and illustrations.
B.W.

N83-33209 ESDU International Ltd., London (England).
STRONG WINDS IN THE ATMOSPHERE BOUNDARY LAYER. PART 1: MEAN HOURLY WIND SPEEDS
Sep. 1982 51 p refs Supersedes ESDU-72026
(ESDU-82026-Amend-A; ESDU-72026; ISBN-0-85679-407-4; ISSN-0141-4003) Avail: ESDU

This Data Item is an addition to the Wind Engineering Subseries. Methods for estmating the variation of strong mean hourly wind speeds in the atmospheric boundary layer are presented. The data are particularly applicable in calculations of wind loads on buildings and structures. The range includes heights between gound level and the edge of the Earth's boundary layer (500-3000 m) over various types of terrain including those where step changes in surface roughness occur upwind of the site. The methods described, start with a known reference wind speed applicable for a specified terrain and height such as taken from a map of extreme wind speeds. Factors are then given by which this value must be multiplied to account for the terrain roughness for changes in terrain upwind of the site and for different heights above the ground. Statistical factors are given to account for return periods and risks of exceedance other than applicable to the reference wind speed. Topographical effects, such as those produced by embankments, escarpments and nearby hills are noted for the U.K. a new map of the once in 50 year mean hourly wind speed is provided together with factors giving the equivalent directional extremes in 30 deg sectors based on new work from the building research establishment. Sources are provided of extreme wind speed data in other countries.
ESDU

N83-33210 ESDU International Ltd., London (England).
PARABOLOIDAL ANTENNAS: WIND LOADING. PART 1: MEAN FORCES AND MOMENTS
Dec. 1982 23 p refs
(ESDU-82031-Pt-1; ISBN-0-85679-414-7; ISSN-0141-4003) Avail: ESDU

This Data Item is an addition to the Wind Engineering Subseries. Force and moment coefficients for use primarily in estimating mean wind loading on stationary or slow moving paraboloidal reflectors such as are used for microwave communications antennas, radio telescopes and solar energy concentrations are given. The data may also be used to estimate the mean loading induced by other gas or liquid flows over paraboloidal shapes. The data apply for solidor perforated-surfaced paraboloidal antennas with focal length/diameter ratios between 0.15 and 0.5 and with minimal backup and support structures. The effects of backup and support structures and of other nearby antennas are discussed briefly. Also discussed are the effects of turbulence, shear flow, and hysteris of the flow. A calculation sheet provides a step-by-step procedure for calculating the basic forces and moments in a body-axis system and a method and equations for conversion to other axis systems are provided.
ESDU

N83-33211 ESDU International Ltd., London (England).
ALLOWABLE STRESSES FOR HELICAL COMPRESSION AND TENSION SPRINGS OF ROUND WIRE
Dec. 1982 33 p refs

(ESDU-83002; ISBN-0-85679-421-X; ISSN-0141-4089) Avail: ESDU

This Data Item is an addition to the Stress and Strength Sub-series. A graphical presentation of the allowable stresses in both compression and tension springs for static or fatigue loading of common spring materials is given. Data are presented for 6 carbon steels, 4 alloy steels, 6 stainless steels, 3 titanium alloys, beryllium, copper and phosphor bronze to British, U.S. and German standards. The influence on fatigue life of spring geometry, elevated temperature, corrosive environments, and surface finish are discussed. Treatments that improve fatigue life such as pre-stressing, short peening, abrasive cleaning and low temperature heat treatment are examined. A procedure for estimating a complete SN curve from available static and fatigue data is outlined. The materials are tabulated for easy reference and an example of how the graphs are used is also included. ESDU

N83-33212 ESDU International Ltd., London (England).
FATIGUE PROPAGATION RATES AND THRESHOLD STRESS INTENSITY FACTOR RANGES FOR ALUMINIUM ALLOY SHEET
Apr. 1983 30 p refs Supersedes ESDU-73021
(ESDU-83007; ESDU-73021; ISBN-0-85679-427-9; ISSN-0141-3996) Avail: ESDU

This Data Item is an addition to the Fatigue-Fracture Mechanics Data Sub-series. Constant amplitude fatigue crack propagation rate (da/dN) data are provided for several aluminum alloy sheet materials commonly used in the aerospace industry. The data have been derived from tests conducted in laboratory air at room temperature and mean da/dN curves are presented in terms of the stress intensity factor range and the stress ratio, R. Where possible curves representing the upper limit of 95% of the data are also provided. The ranges of da/dN covered are from .001/cycle down to the fatigue threshold factor range at da/dN = 1.0 to the -11 m/cycle. The effects of variations in stress ratio R, test piece thickness, grain flow and environment are discussed. Details of all the alloys and types of test pieces are tabulated and summary da/dN curves that compare the performance of the different alloys are given. Curves showing the effect of variations in the value of R at the fatigue threshold factor range for the various alloys are also presented. ESDU

N83-33213 ESDU International Ltd., London (England).
DAMPING OF STRUCTURES. PART 1: TALL BUILDINGS
May 1983 19 p refs
(ESDU-83009; ISBN-0-85679-430-9; ISSN-0141-4003) Avail: ESDU

This Data Item is an addition to the Wind Engineering Subseries. The mechanisms of damping in a tall building, and the effect of increasing amplitude of vibration on the modal damping are discussed. Methods of measuring the modal damping, with an explanation of the accuracy of measured values, are outlined. Various techniques for increasing the modal damping in buildings are considered. The mode generalized parameters required for the response calculations by the normal mode method are presented, and their application in the design of damped scale models of full scale buildings is discussed. Other modal damping expressions commonly used in the study of tall building response other than the modal damping ratio expression used are given. ESDU

N83-33214 Royal Aircraft Establishment, Farnborough (England).
THE ROLE OF A FATIGUE DAMAGE ACCUMULATION PLOT IN STRUCTURAL LOADS DATA ANALYSIS
Dorothy M. Holford 23 Dec. 1982 23 p refs
(RAE-TR-82125; RAE-Mat/Struct-24; BR87777) Copyright. Avail: Issuing Activity

The concept of displaying the accumulation of fatigue damage against time into flight is described. Ground mode presentation is suitable for use in ground analysis of load time histories; the snapshot mode can be used in real time. Examples from operational aircraft loads data demonstrate the usefulness of the display. The damage accumulation plot permits a ready identification of flight conditions/flight activities which provoke substantial fatigue damage. It can be used to identify the structurally relevant flight data and so reduce the quantity of data that needs to be analyzed in an operational loads measurement program. It is particularly important in advanced fatigue load monitoring systems, fleet management from a fatigue standpoint, and in the specification of fatigue test loading sequences. Author (ESA)

N83-33215*# National Materials Advisory Board, Washington, D.C.
FRACTURE IN COMPRESSION OF BRITTLE SOLIDS Final Report
Aug. 1983 72 p refs
(Contract MDA-90382-C-0434)
(NASA-CR-172960; NAS 1.26:172960; NMAB-404) Avail: NTIS HC A04/MF A01 CSCL 20K

The fracture of brittle solids in monotonic compression is reviewed from both the mechanistic and phenomenological points of view. The fundamental theoretical developments based on the extension of pre-existing cracks in general multiaxial stress fields are recognized as explaining extrinsic behavior where a single crack is responsible for the final failure. In contrast, shear faulting in compression is recognized to be the result of an evolutionary localization process involving en echelon action of cracks and is termed intrinsic. Author

N83-33216*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECT OF STRAIN ISOLATOR PAD MODULUS ON INPLANE STRAIN IN SHUTTLE ORBITER THERMAL PROTECTION SYSTEM TILES
James Wayne Sawyer Aug. 1983 48 p refs
(NASA-TP-2141; L-15575; NAS 1.60:2141) Avail: NTIS HC A03/MF A01 CSCL 20K

The thermal protection system used on the Space Shuttle orbiter to determine strains in the reusable surface insulation tiles under simulated flight loads was investigated. The effects of changes in the strain isolator pad (SIP) moduli on the strains in the tile were evaluated. To analyze the SIP/tile system, it was necessary to conduct tests to determine inplane tension and compression modulus and inplane failure strain for the densified layer of the tiles. It is shown that densification of the LI-900 tile material increases the modulus by a factor of 6 to 10 and reduces the failure strain by about 50%. It is indicated that the inplane strain levels in the Shuttle tiles in the highly loaded regions are approximately 2 orders of magnitude lower than the failure strain of the material. It is concluded that most of the LI-900 tiles on the Shuttle could be mounted on a SIP with tensile and shear stiffnesses 10 times those of the present SIP without inplane strain failure in the tile. E.A.K.

N83-33217*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
TEMPERATURE DISTRIBUTION IN AN AIRCRAFT TIRE AT LOW GROUND SPEEDS
John Locke McCarty and John A. Tanner Aug. 1983 36 p refs
(NASA-TP-2195; L-15605; NAS 1.60:2195) Avail: NTIS HC A03/MF A01 CSCL 20K

An experimental study was conducted to define temperature profiles of 22 x 5.5, type 7, bias ply aircraft tires subjected to freely rolling, yawed rolling, and light braking conditions. Temperatures along the inner wall of freely rolling tires were greater than those near the outer surface. The effect of increasing tire deflection was to increase the temperature within the shoulder and sidewall areas of the tire carcass. The effect of cornering and braking was to increase the treat temperature. For taxi operations at fixed yaw angles, temperature profiles were not symmetric. Increasing the ground speed produced only moderate increases in tread temperature, whereas temperatures in the carcass shoulder and sidewall were essentially unaffected. Author

N83-33218*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Coll. of Engineering.

AN EVALUATION OF THE EFFECTS OF STACKING SEQUENCE AND THICKNESS ON THE FATIGUE LIFE OF QUASI-ISOTROPIC GRAPHITE/EPOXY LAMINATES

C. E. Harris and D. H. Morris Apr. 1983 108 p refs
(Grant NAG1-264)
(NASA-CR-172169; NAS 1.26:172169; VPI-E-83-16) Avail: NTIS HC A06/MF A01 CSCL 20K

Notched and unnotched geometries at 16, 32, and 64-ply thicknesses of a [90/45/0-45](ns) laminate and a [45/0/-45/90](ns) laminate were tested in compression-compression fatigue. The fatigue life and the initiation, type, and progression of damage were determined. Interlaminar stresses generated at straight, free edges of axially loaded laminates were used to interpret the test results. The fatigue lives of the notched specimens did not appear to be a strong function of laminate stacking sequence or specimen thickness. The stress concentration at the hole dominated over the interlaminar stresses at the straight free edge. The unnotched specimens of the [90/45/0/-45](ns) laminate with tensile interlaminar normal stresses delaminated more readily than did the [45/0/-45/90](ns) laminate with compressive interlaminar normal stress. The life of the 16-ply unnotched specimens was lower than the 32- and 64-ply specimens. Delaminations were located at the interface where the maximum shear stress occurred regardless of the sense or magnitude of the interlaminar normal stress. An antibuckling fixture was effective in preventing out-of-plane motion without overconstraining the specimen. A.R.H.

N83-33219*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.

GEOMETRICALLY NONLINEAR ANALYSIS OF LAYERED COMPOSITE PLATES AND SHELLS Interim Report

Wei-Chang Chao and J. N. Reddy Feb. 1983 117 p refs
(Grant NAG3-208)
(NASA-CR-168182; NAS 1.26:168182; VPI-E-83.10) Avail: NTIS HC A06/MF A01 CSCL 20K

A degenerated three dimensional finite element, based on the incremental total Lagrangian formulation of a three dimensional layered anisotropic medium was developed. Its use in the geometrically nonlinear, static and dynamic, analysis of layered composite plates and shells is demonstrated. A two dimenisonal finite element based on the Sanders shell theory with the von Karman (nonlinear) strains was developed. It is shown that the deflections obtained by the 2D shell element deviate from those obtained by the more accurate 3D element for deep shells. The 3D degenerated element can be used to model general shells that are not necessarily doubly curved. The 3D degenerated element is computationally more demanding than the 2D shell theory element for a given problem. It is found that the 3D element is an efficient element for the analysis of layered composite plates and shells undergoing large displacements and transient motion. E.A.K.

N83-33220*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.

STRESSES IN A QUASI-ISOTROPIC PIN LOADED CONNECTOR USING PHOTOELASTICITY Contractor Report, 16 Mar. 1982 - 15 Mar. 1983

Michael W. Hyer and Dahsin H. Liu Aug. 1983 28 p refs
(Grant NsG-1621)
(NASA-CR-172135; NAS 1.26:172135) Avail: NTIS HC A03/MF A01 CSCL 20K

Birefringent glass-epoxy and a numerical stress separation scheme are used to compute the stresses in the vicinity of a pin-loaded hole. The radial and circumferential stresses at the hole edge, and the net section and shear-out stresses are computed. The numerical and experimental results are compared with the computed stresses. The fixture used to load the connector is discussed and typical isochromatic and isoclinic fringe patterns are presented. The stress-separation scheme is briefly discussed. S.L.

N83-33221*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

LONG DURATION EXPOSURE FACILITY (LDEF) STRUCTURAL VERIFICATION TEST REPORT

Thomas C. Jones, Melvin H. Lucy, and Richard L. Shearer Jun. 1983 73 p refs
(NASA-TM-85672; NAS 1.15:85672) Avail: NTIS HC A03/MF A01 CSCL 20K

Structural load tests on the Long Duration Exposure Facility's (LDEF) primary structure were conducted. These tests had three purposes: (1) demonstrate structural adequacy of the assembled LDEF primary structure when subjected to anticipated flight loads; (2) verify analytical models and methods used in loads and stress analysis; and (3) perform tests to comply with the Space Transportation System (STS) requirements. Test loads were based on predicted limit loads which consider all flight events. Good agreement is shown between predicted and observed load, strain, and deflection data. Test data show that the LDEF structure was subjected to 1.2 times limit load to meet the STS requirements. The structural adequacy of the LDEF is demonstrated. E.A.K.

N83-33222# California Univ., Berkeley. Lawrence Berkeley Lab. Accelerator and Fusion Research Div.

MECHANICAL PROPERTIES OF Nb SUB 3 Sn STRANDED SUPERCONDUCTING POTTED CABLE WINDINGS

S. Caspi, R. B. Meuser, and R. C. Wolgast Nov. 1982 8 p ref Presented at the Applied Superconductivity Conf., Knoxville, Tenn., 28 Nov. - 3 Dec. 1982
(Contract DE-AC03-76SF-00098)
(DE83-005928; LBL-14481; CONF-821108-14) Avail: NTIS HC A02/MF A01

The electromagnetic stresses in projected designs of high field magnet coils sometimes exceed the yield points or creep strengths of the coil-winding materials. This is especially true of react-after-winding Nb3Sn coils, plastic insulating materials, and the crossed strands of twisted cable. Compression stress-strain curves of stranded and twisted flat cable coil-winding specimens for reacted and epoxy-impregnated Nb3Sn coils, at 300 K and 80 K are presented. The lateral and longitudinal strains of one specimen were measured along with the direct compressive stress-strain, at 300 K. A similar specimen was compressed to 40 MPa (6 kpsi) at room temperature and then to 145 MPa (20 kpsi) at 80 K. Plastic flow occurred up the maximum stress. Stress cycles subsequent to maximum stress were elastic. Some specimens were mounted in a rigid enclosure to simulate hydrostatic containment of the magnet coil. DOE

N83-33223# Oak Ridge National Lab., Tenn.

NEW METHOD FOR ANALYZING SMALL-SCALE FRACTURE-SPECIMEN DATA IN THE TRANSITION ZONE

J. G. Merkle 1982 8 p refs Presented at 10th Water Reactor Safety Res. Inform. Conf., Gaithersburg, Md., 12 Oct. 1982
(Contract W-7405-eng-26)
(DE83-001925; CONF-821037) Avail: NTIS HC A02/MF A01

Among the problems related to the use of small specimens for measuring fracture toughness, those concerning size effects and data scatter are perennial. An attempt was made to find a suitable method for adjusting individual small specimen fracture toughness values for size effects in the transition range of temperature. Irwin's beta/sub Ic/ equation recognizes an interaction between toughness and size. If either toughness increases or size decreases, the ratio K/sub c//K/sub Ic/ will increase. This interaction magnifies the scatter inherent in plane strain K/sub Ic/ values. Although the more common application of the beta/sub Ic/ formula is the estimation of K/sub c/ values from known values of B and K/sub Ic/, the original application was the one considered here, i.e., the estimation of K/sub Ic/ from measured values of B and K/sub c/. So the application described here is mainly the use of small specimen test data, analyzed inelastically. DOE

N83-33224# Los Alamos Scientific Lab., N. Mex. Materials Science and Technology Div.

MATERIALS RESPONSE TO LARGE PLASTIC DEFORMATION

M. G. Stout and S. S. Hecker 1982 22 p refs Presented at the 29th Ann. Sagamore Army Mater. Res. Conf., Lake Placid, N.Y.,19-23 Jul. 1982

(Contract W-7405-eng-36)
(DE83-003643; LA-UR-82-3346; CONF-820725-4) Avail: NTIS HC A02/MF A01

Strain hardening at large plastic strains which cannot be inferred from small strain tensile tests are discussed. Most metals and alloys at room temperature do not reach steady state saturation at strain levels of 3 to 5. Typically, some disturbing influence offsets the balance between dislocation generation and annihilation. The most prominent of these appears to be texture formation. However, grain size, second phase particles, and deformation on shear bands are also important. The effect on hardening of most of these features depends on geometry (or deformation mode) and, hence, no single intrinsic hardening curve can be expected at large strains. It should be noted that high material purity and a torsional deformation mode favor saturation. GRA

N83-33225# Sandia Labs., Albuquerque, N. Mex.
EVALUATION AND CONTROL OF CONSERVATISM IN DROP-TABLE SHOCK TESTS
Thomas J. Baca 1982 36 p refs Presented at the 53rd Shock and Vibration Symp., Danvers, Md., 26 Oct. 1982
(Contract DE-AC04-76DP-00789)
(DE83-004134; SAND-82-1548C; CONF-821040-2) Avail: NTIS HC A03/MF A01

Absolute acceleration shock spectra are the most common means of characterizing mechanical shocks. These shock spectra are of limited use in making a quantitative evaluation of the conservatism contained in a laboratory shock test. A technique for evaluating and controlling the conservatism in drop table shock tests is presented. Alternative characterizations of shock transients are introduced which compensate for the limitations of absolute acceleration shock spectra in representing shock environments. A method of analyzing both field and laboratory shock environments is developed which can be used for any type of shock characterization to account for the variability in the description of the environments. Conservatism between the field and laboratory shock environment is then quantified in terms of the index of conservatism (IOC). The IOC can be calculated for any response characteristic of interest. DOE

N83-33226# Oak Ridge National Lab., Tenn. Computer Sciences Div.
APPLICATIONS OF ENERGY-RELEASE-RATE TECHNIQUES TO PART-THROUGH CRACKS IN PLATES AND CYLINDERS, VOLUME 1. ORMGEN-3D: A FINITE ELEMENT MESH GENERATOR FOR 3-DIMENSIONAL CRACK GEOMETRIES
B. R. Bass and J. W. Bryson Dec. 1982 73 p refs
(Contract W-7405-eng-26)
(DE83-3003701; NUREG/CR-2997-Vol-1; ORNL/TM-8527-Vol-1) Avail: NTIS HC A04/MF A01; also available HC SOD

The ORMGEN-3D (Oak Ridge Mesh GENerator - 3D) finite element mesh generator program for computational fracture mechanics analysis is described. The program automatically generates a three dimensional (3-D) finite element model for six different crack geometries. These geometries include flat plates with straight or curved surface cracks and cylinders with part through cracks on the outer or inner surface. Mathematical or user defined crack shapes are considered. The ORMGEN-3D generates a core of special wedge or collapsed prism elements at the crack front to introduce the appropriate stress singularity at the crack tip. Regular 20 node isoparametric brick elements are used elsewhere in the modeling. A cladding option is available which allows for an embedded or penetrating crack in the clad material. DOE

N83-33227# Blume (John A.) and Associates Research Div., San Francisco, Calif.
VIBRATION TESTING OF AN EPOXY-REPAIRED REINFORCED CONCRETE TEST STRUCTURE
G. Norman Owen, Ike O. Egbuonye, Onder Kustu, and Roger E. School Mar. 1983 98 p refs
(Contract DE-AC08-81NV-10145; Grant NSF CEE-78-12714)
(DE83-011379; JAB-10145-3) Avail: NTIS HC A05/MF A01

A full-scale, 4-story reinforced concrete structure, deliberately damaged by forced vibration in 1974, was repaired by the epoxy-injection method and retested in 1979 using the same reciprocating-mass vibration generator. The program consisted of a series of tests, beginning with low-amplitude vibrations, followed by forced vibrations, increased into the range of inelastic response of the structure. The test program was similar to the 1974 testing of the original, undamaged structure. Structural damage from the first destructive test was extensive, consisting of x-cracking and spalling at the beam-column connections. The 1979 damage to the epoxy-repaired structure was similar to that sustained by the original structure in 1974, but the cracking was more widely distributed, and, in general, damage was less severe following the 1979 test. The results of this study show that, for low-amplitude motions, the epoxy-repaired structure was slightly less stiff than the original undamaged structure. However, a plot of the destructive-test data shows that, as the amplitude of the structure's response increased, the difference in stiffness between the epoxy-repaired structure and the original structure decreased.DOE

N83-33228# Lockheed Missiles and Space Co., Palo Alto, Calif.
BUCKLING OF STEEL-CONTAINMENT SHELLS. TASK 1A: DYNAMIC RESPONSE AND BUCKLING OF OFFSHORE POWER SYSTEMS' FLOATING NUCLEAR PLANT CONTAINMENT VESSEL, VOLUME 1, PART 1 Final Report
E. Meller and D. Bushnell Dec. 1982 258 p refs
(Contract NRC-FIN-B-6568)
(DE83-901035; NUREG/CR-2836-Vol-1-Pt-1; LMSC-D812950-Vol-1-Pt-1) Avail: NTIS HC A12/MF A01; also available HC SOD $8.00

Static and dynamic analyses of the steel containment vessel of the Offshore Power Systems' (OPS) floating nuclear plant were conducted with use of several computer programs. The OPS containment shell was evaluated with respect to buckling. Results from modal vibration and linear dynamic response analyses of the OPS containment neglecting and including the large equipment hatch and results from buckling analyses for a variety of models are given. It is concluded that inclusion of the equipment hatch and its attachments does not significantly affect the dynamic response of the OPS vessel to the loading history provided by OPS. Good agreement is obtained for static stress and buckling predictions from PANDA, BOSOR4, BOSOR5, and STAGSC-1 for cases in which more than one of these computer programs can be applied to the same configuration and loading. DOE

N83-33229# Los Alamos Scientific Lab., N. Mex.
BUCKLING INVESTIGATION OF RING-STIFFENED CYLINDRICAL SHELLS UNDER UNSYMMETRICAL AXIAL LOADS
William Baker, Joel Bennett, and Charles Babcock Oct. 1982 78 p refs
(Contract W-7405-eng-36)
(DE83-005348; NUREG/CR-2966; LA-9536-MS) Avail: NTIS HC A05/MF A01

Baseline values for the buckling loads and modes for ring-stiffened cylindrical shells that have geometric parameters characteristic of the ring-stuffened cylindrical section of a typical nuclear steel containment vessel are established. Methods, measurements, and data reduction techniques are included. In addition, these experiments serve as a set of benchmark experiments for computer codes that can predict buckling loads for axisymmetric geometrics. Complete material stress-strain curves are described and complete geometric imperfection data for the shells are given. Typical load-strain information is reported, as well as the distribution of load around the cylinder at buckling. A method for taking and reducing chord gage measurements to characterize the out-of-roundness imperfections is also examined and comparisons to actual imperfection sweep measurement are made. DOE

N83-33230# Sandia Labs., Albuquerque, N. Mex.
GENERAL METHOD FOR FATIGUE ANALYSIS OF VERTICAL-AXIS WIND-TURBINE BLADES
Paul S. Veers 1983 8 p refs Presented at the 6th Biennial

Wind Energy Conf., Minneapolis, Minn., 1 Jun. 1983
(Contract DE-AC04-76DP-00789)
(DE83-012226; SAND-82-2543C; CONF-830631-2) Avail: NTIS HC A02/MF A01

The fatigue life of wind-turbine blades, which are exposed to the random loading environment of atmospheric winds, is described with random data analysis procedures. The incident windspeed and the stresses caused by these winds are expressed in terms of probability density functions while the fatigue life vs. stress level relationship is treated deterministically. This approach allows the fatigue damage to be expressed as a function of wind speed as a damage density function. By examining some of the constraints on the variables in the damage density expression, some generalizations of the wind-turbine fatigue problem are obtained. The area under the damage density function is inversely related to total fatigue life. Therefore, an increase in fatigue life due to restricted operation in certain wind regimes is readily visualized. An on parameter which is the percentage of total time at each windspeed that the turbine actually operates is introduced for this purpose. An example calculation is presented using data acquired from the 17 meter turbine program. DOE

N83-33231# National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
ANOTHER METHOD TO SEPARATE PRINCIPAL STRAINS IN PHOTOELASTIC COATINGS
P. J. Sevenhuijsen 26 Jan. 1983 9 p refs Submitted for publication
(NLR-MP-81011-U) Avail: NTIS HC A02/MF A01

The combination of a prism and a reflection polariscope provided with a Babinet-Soleil compensator is shown to be a simple solution for the problem of separation of the principal strains in photoelastic coatings. The prisms should have glass with a large index of refraction, dimensions adapted to the coating thickness, a rooftop angle < 90 deg, and the rooftop blocked for light in order to see only the coating area of interest just under the rooftop. Author (ESA)

N83-33232# National Aerospace Lab., Amsterdam (Netherlands). Flight Dynamics Div.
THE AERODYNAMIC STABILITY OF THE PROPOSED WESTERN-SCHELDT SUSPENSION BRIDGE
A. J. Persoon and C. M. Siebert Mar. 1982 24 p refs Presented Intern. Conf. on Flow Induced Vibrations in Fluid Eng., Reading, England, 14-16 Sep. 1982
(NLR-MP-82017-U) Avail: NTIS HC A02/MF A01

The flutter stability of a suspension bridge deck and the wind induced response of the pylons were studied in a wind tunnel. For the flutter predictions, aerodynamic derivatives were measured using an oscillating bridge deck model. Flutter calculations based on these derivatives result in an aerodynamically unstable bridge deck. The predicted response of the pylon is acceptable. Author (ESA)

N83-33233# National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
LIFETIME PREDICTION METHODS FOR CORNER CRACKS AT HOLES
C. J. Lof 11 Jan. 1983 11 p refs Presented at AGARD Conf. on Behavior of Short Cracks in Airframe Components, Toronto, 20-21 Sep. 1982
(NLR-MP-82042-U) Avail: NTIS HC A02/MF A01

An application of linear elastic fracture mechanics to three dimensional crack growth prediction was developed. Corner flaw growth during constant amplitude fatigue testing was studied. A lifetime prediction algorithm based on investigated crack behavior as a function of calculated instantaneous stress intensity distribution along the crack boundary was developed. Comparison of results with data from experiments and from the literature shows very acceptable agreement. Author (ESA)

N83-33234# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
FATIGUE CRACK GROWTH OF CORNER CRACKS IN LUG SPECIMENS
S. Friedrich and J. Schijve Jan. 1983 29 p refs
(VTH-LR-375) Avail: NTIS HC A03/MF A01

Constant amplitude tests and simplified flight simulation tests with one peak load per flight were carried out on 7075-T6 lug specimens. Corner cracks at the pin loaded hole were initiated by a small starter notch. Applications of marker loads indicated successive locations of the crack front on the fracture surfaces. These indications gave information about crack shape development and crack growth rates along the crack front. The latter data were used to determine empirical stress intensity factors, which were compared to calculated data. Damage calculations gave indications on crack growth retardation of corner cracks. Author (ESA)

N83-33235# Centre de Recherches Scientifiques et Techniques de l'Industrie des Fabrications Metalliques, Brussels (Belgium). Section: Construction Metallique.
STUDY OF THE BUCKLING OF STEEL BEAM COLUMNS WITH NONSYMMETRIC CROSS SECTION [ETUDE DU FLAMBEMENT PLAN DE POUTRES COLONNES EN ACIER A SECTION NON SYMMETRIQUE]
Serge Cescotto (Liege Univ.), Stephane Gilson (Liege Univ.), Andre Plumier (Liege Univ.), and Jacques Rondal (Liege Univ.) May 1983 79 p refs In FRENCH; ENGLISH summary Sponsored by Inst. pour l'Encouragement de la Recherche Scientifique dans l'Industrie et l'Agriculture
(CRIF-MT-153) Avail: NTIS HC A05/MF A01

Design rules for buckling of beam-columns, the section of which presents only one plane of symmetry were derived. Buckling loads obtained according to these rules were compared with test results and numerical simulations performed on T and delta cross sections. Satisfactory agreement is observed between experimental and theoretical results. Author (ESA)

N83-33236# Centre de Recherches Scientifiques et Techniques de l'Industrie des Fabrications Metalliques, Brussels (Belgium). Section: Construction Metallique.
EXTERNAL LOADINGS ON NOZZLES IN CYLINDRICAL SHELLS Progress Report
Joris Decock May 1983 40 p refs Sponsored by Inst. pour l'Encouragement de la Recherche Scientifique dans l'Industrie et l'Agriculture
(CRIF-MT-155; PR-5) Avail: NTIS HC A03/MF A01

The stress distribution in thin walled cylindrical shells with a ratio $D/T = 125$, with the ratio d/D ranging from 0.1 to 0.75 was studied. Design curves from which the maximum stresses in the shell and the nozzle can be derived when the nozzle is submitted to various types of external loads, and graphs for defining the value of local stresses due to internal pressure alone are presented. The WRC and BS 5500 design methods for external loads are considered. According to WRC, stresses due to internal pressure are not considered and consequently the resulting maximum stresses due to a combination of external load and internal pressure cannot be derived. According to the BS 5500 a conservative result is obtained for total stresses if the maximum local stress due to internal pressure is simply added to those due to external loads. This leads to an overconservative result which is confirmed by the experiments. Author (ESA)

N83-33237# Christian Michelsens Institutt for Videnskap og Andsfrihet, Bergen (Norway). Dept. of Science and Technology.
SHEAR PROPERTIES OF PARTICULATE MATERIALS: SELECTION OF A REFERENCE MATERIAL
Gisle G. Enstad Apr. 1982 17 p
(PB83-183822; CMI-823150-3) Avail: NTIS HC A02/MF A01 CSCL 14B

A reference material for the Jenike shear cell has been sought by seven European laboratories. One out of six materials has been chosen. This report records measurements made at CMI during this work. GRA

N83-32722# Air Force Systems Command, Wright-Patterson AFB, Ohio.
APPLICATION OF MULTIPLE DYNAMIC ABSORBERS TO REDUCE THE VIBRATION LEVEL OF A COMPLEX CANTILEVER STRUCTURE
Tian Qianli *In its* Acta Aeron. et Aeronautica Sinica (FTD-ID(RS)T-1605-82) 4 Mar. 1983 p 69-79 refs Transl. into ENGLISH from Hang Kong Xuebao (China), v. 3, no. 3, Sep. 1982 p 42-47 (For primary document see N83-32717 21-01)
Avail: NTIS HC A08/MF A01 CSCL 20/11

N83-32723# Air Force Systems Command, Wright-Patterson AFB, Ohio.
A SPECTRAL APPROACH FOR ANALYZING THE VIBRATION OF A PERIODIC STRUCTURE WITH RANDOM PARAMETERS
Huang Wen Hu *In its* Acta Aeron. et Astronautica Sinica (FTD-ID(RS)T-1605-82) 4 Mar. 1983 p 80-97a refs Transl. into ENGLISH from Hang Kong Xuebao (China), v. 3, no. 3, Sep. 1982 p 50-60 (For primary document see N83-32717 21-01)
Avail: NTIS HC A08/MF A01 CSCL 20/11

N83-32730# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE BIPARAMETRIC CYCLE COUNT METHOD AND THE PRINCIPLE OF SIMPLIFICATION
Jiang Zuguo *In its* Acta Aeron. et Astronautica Sinica (FTD-ID(RS) T-0664-82) 4 Mar. 1983 p 38-69 refs Transl. into ENGLISH from Hang Kong Xuebao (China), v. 2, no. 1, 1981 22 p (For primary document see N83-32727 21-01)
Avail: NTIS HC A10/MF A01 CSCL 20/11

N83-32731# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
A FINITE ELEMENT METHOD FOR LOCAL STABILITY OF A STIFFENED PANEL IN AXIAL COMPRESSION
Liu Dongchang (Aircraft Strength Inst.) *In its* Acta Aeron. et Astronautica Sinica (FTD-ID(RS)T-0664-82) 4 Mar. 1983 p 70-93 refs Transl. into ENGLISH from Hang Kong Xuebao (China), v. 2, no. 1, 1981 24 p (For primary document see N83-32727 21-01)
Avail: NTIS HC A10/MF A01 CSCL 20/11

N83-32970 Polish Academy of Sciences, Warsaw.
DEPARTMENT OF THEORY OF CONTINUOUS MEDIA
In its Sci. Activities of the Polish Acad. of Sci. 1983 p 7-12 (For primary document see N83-32969 21-31)
Avail: Issuing Activity

N83-33665# Tokyo Denki Univ. (Japan).
A NUMERICAL PROCEDURE FOR NONLINEAR RESPONSE ANALYSIS OF BUILDING SUBJECTED TO MULTI-INPUT
Fukuzo Suto and Shyuichi Asayama *In its* Res. Repts. of the Fac. of Eng., Tokyo Denzi Univ., No. 30 Dec. 1982 p 103-120 refs In JAPANESE; ENGLISH summary (For primary document see N83-33656 21-70)
Avail: NTIS HC A08/MF A01

N83-33666# Tokyo Denki Univ. (Japan).
CONSIDERATIONS ON DEFORMABLE ABILITY AND ULTIMATE STRENGTH OF ASEISMIC WALLS. PART 1: ABOUT THE COUNTER-MEASURE FOR THE IMPROVEMENT OF WALL-DEFORMABILITY
Fukuzo Suto *In its* Res. Repts. of the Fac. of Eng., Tokyo Denki Univ., No. 30 Dec. 1982 p 121-144 refs In JAPANESE; ENGLISH summary (For primary document see N83-33656 21-70)
Avail: NTIS HC A08/MF A01

42 GEOSCIENCES (GENERAL)

N83-33238# Academy of Sciences (USSR), Moscow. Inst. of Geography.
GEOSYSTEM STUDIES FOR MONITORING
A. M. Green, ed., L. M. Ananjeva, ed., and V. D. Utekhin, ed. 1981 199 p refs In RUSSIAN; ENGLISH summaries
Avail: NTIS HC A09/MF A01

Problems of geosystem modeling and monitoring are discussed, as well as investigations of energetical and material exchange in geosystems. For individual titles, see N83-33239 through N83-33261.

N83-33239# Academy of Sciences (USSR), Moscow.
ON CLASSIFICATION OF MONITORING AND ON A PLACE IN IT OF GEOSYSTEM MONITORING **c46**
V. D. Utekhin *In its* Geosystem Studies for Monitoring 1981 p 8-14 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

The relation of monitoring divisions, introduced by I. P. Gerasimov (bio-ecological, geosystem, biospheric) to other classifications of monitoring is studied. Development of methods of geosystem monitoring is related with the development of mathematical simulation, automatization of research and remote sensing technique. R.J.F.

N83-33240# Academy of Sciences (USSR), Moscow.
CLASSIFICATION OF DEVELOPING SYSTEMS AS PREMISE FOR WORKING OUT OF ADEQUATE MATHEMATICAL MODELS OF GEOSYSTEMS **c46**
V. E. Obuchov *In its* Geosystem Studies for Monitoring 1981 p 15-20 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

The classification of developing systems as a premise for the working out of mathematical models of geosystems for the purposes of monitoring is discussed. The classification of developing complex systems in general and geoystems in particular are considered. This classification is dialectically completed and closed. Main classes of complex systems, steps of their development and the evolution of the dynamics of parts and relations of systems are characterized. This conceptual model may be applied for modelling. The closer the geosystem in study is to complex system, the more accurate is its model. R.J.F.

N83-33241# Academy of Sciences (USSR), Moscow.
MATHEMATICAL CONCEPT OF GEO- AND ECOSYSTEMS STABILITY AS A CHARACTER IMPORTANT FOR MONITORING **c45**
V. A. Svetlosanov *In its* Geosystem Studies for Monitoring 1981 p 20-26 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

Mathematic conceptions of geo- and ecosystems stability from the point of view of remote sensing are discussed. Two approaches to the investigation of geo- and ecosystem stability are considered and critically compared. The system is described by ordinary differential equations. Therefore, the question of its stability must be decided by the Ljapunov method. Probable types of outside influences affecting the system are analyzed. The concept of ecosystem stability and the possibility applying the Ljapunov criterion to ecosystems are formulated. R.J.F.

N83-33242# Academy of Sciences (USSR), Moscow.
SYSTEM APPROACH TO GEOSYSTEM MONITORING **c46**
N. I. Rudnev *In its* Geosystem Studies for Monitoring 1981 p 27-39 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

The basic requirements for system analysis and simulation of geosystem are reviewed. Original formulations of big system, complex system, and geosystem concepts are given. A generalized conceptual model of the geosystem and methods of its formalization are analyzed. General requirements for a probable procedure of monitoring and its automatization are given. R.J.F.

N83-33243# Academy of Sciences (USSR), Moscow.
RESEARCHES OF GEOSYSTEM FUNCTIONAL STRUCTURE AND ITS AUTHROPOGENOUS TRANSFORMATION AT THE KURSK FIELD EXPERIMENTAL BASE AS A BASE FOR DEVELOPING OF GEOSYSTEMS MONITORING **c46**
A. M. Green and V. D. Utekhin *In its* Geosystem Studies for Monitoring 1981 p 39-45 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

At the Kursk field experimental base (USSR), geosystem physics and chemistry, their mathematical modelling and the investigation of relations between natural and socio-economical components of geosystems are studied. Investigations of the problems and monitoring are also carried out. R.J.F.

N83-33244# Academy of Sciences (USSR), Moscow.
BIOENERGETICAL ASPECTS OF ECOLOGICAL MODELS AND THEIR CLASSIFICATION **c45**
I. I. Sventitsky and I. I. Tkatchenko *In its* Geosystem Studies for Monitoring 1981 p 46-56 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

Bioenergetical properties of objects in mathematical modelling in ecology are discussed. New ways for improving models based on the system bioenergetical approach for studying geo- and ecosystems productivity are proposed. R.J.F.

N83-33245# Academy of Sciences (USSR), Moscow.
A SIMPLE MODEL OF PHYTOCENOSE PRODUCTIVITY AS A PART OF GEOSYSTEM FUNCTIONING LIMITED BY ENERGY **c43**
V. N. Lopatin *In its* Geosystem Studies for Monitoring 1981 p 57-60 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

A simple model of productivity of plant geosystems when energy is the limiting factor is discussed. One method of construction of a simple mathematical model is proposed which may be used in different ecological conditions. A model is constructed for the case when phytomass production is limited. The results are confirmed theoretically and experimentally. R.J.F.

N83-33246# Academy of Sciences (USSR), Moscow.
MODELLING OF A TREE CROWN AS A GEOMETRICAL FIGURE FOR THE NEEDS OF MONITORING **c43**
N. A. Iljina *In its* Geosystem Studies for Monitoring 1981 p 60-69 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

The modelling of tree crowns as geometrical bodies for the monitoring of forest geosystems is discussed. Conceptions of leafless and dead tree crown zones and the simulation procedure of tree crowns as geometrical bodies are introduced together with showing of results for three species of trees: oak, linden and pine. Results of a two way calculation of tree crown volume, surface, and internal zone are described. Equations binding them with the tree diameter are given. R.J.F.

N83-33247# Academy of Sciences (USSR), Moscow.
A MODEL OF GROWTH AND PRODUCTIVITY FOR PERENNIAL PARTS OF GRASSES AND SEMIBUSH PLANTS AND ITS USE FOR MONITORING **c43**
T. S. Sidorova *In its* Geosystem Studies for Monitoring 1981 p 70-80 In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

A model of growth and productivity for perennial parts of grasses and semibush plants and its use for monitoring is discussed. Branching and mass growth of grass rhizomes and perennial aboveground parts of semibush plants can be described exponential equations. Coefficients of the number of branches, the age of the plant, and the age of a tiller in that equation depend on differences in plant genetics and external conditions. Being sufficiently precise, the equations may be used for determination of mass, decay and new growth of plants of the known age. There is a correlation between plant age and some external features that can be described mathematically too. Grass rhizomes as a whole have more high intensity of branching, then semibush plants. Susliks cause losses in weight, production and number of branches of semibushes. R.J.F.

N83-33248# Academy of Sciences (USSR), Moscow.
ON INFLUENCE OF TOPOGRAPHIC AND SOIL CONDITIONS ON FOREST SPREADING IN FOREST-STEPPE LANDSCAPES, INFORMATION ANALYSIS OF IT AND ITS MEANING FOR MONITORING OF FOREST-STEPPE **c43**
E. K. Daineko *In its* Geosystem Studies for Monitoring 1981 p 81-89 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

The influence of topographic and soil condition on the spread of forests in forest-steppe landscapes, the information analysis of it, and its meaning for monitoring of forest-steppes is discussed. It is shown that forest spreading in forest-steppe landscapes is related to the depth of soil-forming heavy clay. The forest exists at places where this depth is minimal, and where lower-laying light clay comes near the soil surface. R.J.F.

N83-33249# Academy of Sciences (USSR), Moscow.
ROLE OF THE WIND IN REDISTRIBUTION OF RAIN PRECIPITATION IN FOREST **c47**
L. V. Medvedev *In its* Geosystem Studies for Monitoring 1981 p 90-101 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

The role of wind in the redistribution of rain in forests is discussed. Correlations of rain data from rain-gages are made so that more accurate predictions of rainfall in any particular place may be obtained. R.J.F.

N83-33250# Academy of Sciences (USSR), Moscow.
RAIN INTERCEPTION BY VEGETATION IN CEREAL CROPS **c47**
V. A. Tjulenjeva *In its* Geosystem Studies for Monitoring 1981 p 101-106 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

Rain interception by cereal crops in Kursk region is negligible at the stages of seedling and tillering, but rises quickly at stem extension and becomes maximal at ripening stage. Average interception per one rain for vegetation season is 1,0-1,8 mm of precipitation; fertilized crop intercepts 0,2--0,4 mm more, than infertilized. Fallen crops intercept 3-5 times more precipitation than normal ones. Author

N83-33251# Academy of Sciences (USSR), Moscow.
DAILY AND SEASONAL DYNAMICS OF LEAF CANOPY ORIENTATION IN PHYTOCENOSES **c43**
E. A. Denisenko and E. D. Gavrilova *In its* Geosystem Studies for Monitoring 1981 p 107-115 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

Daily and seasonal dynamics of leaf canopy distribution are described on the base of values of angle cosine between sun vector and the normal to leaf, which is measured and calculated by Denisenko's method. On well lighted areas distribution curve has, as a rule, one extremum. It is high in the morning and in the evening, when cosine is small (0-0,3), and in midday, when cosine is big (0,7-1,0). There are three or four extremums in shaded places, without relation to any values of cosine. With the increasing of place shading (increasing of tree leaves biomass onto middle of vegetation) number of distribution extremums rises, their height decreases, their correlation with coline value disappears. This way leaf canopy structure depends on light conditions inside the stand. Author

N83-33252# Academy of Sciences (USSR), Moscow.
RELATIONSHIP OF GAS EXCHANGE AND PRODUCTIVITY OF AGROCENOSE (RESULTS OF INVESTIGATIONS IN HERMETIC PHYTOTRONE) **c51**
N. T. Nilovskaya, G. F. Korzheva, and M. O. Smirnov *In its* Geosystem Studies for Monitoring 1981 p 116-124 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

Photosynthesis, respiration, biomass accumulation rate and grain yield of wheat (World Seeds 1877) are stuied in conditions of a hermetic growth chamber. Supporting of constant temperature is more favorable for size, growth and productivity of wheat plants than variations of temperature during growth phases. There are more complex relations than linear dependence between processes of CO2 absorption and accumulation of crop biomass. Author

N83-33253# Academy of Sciences (USSR), Moscow.
DETERMINATION OF OPTICAL RADIATION ENERGY EXPENSES FOR PLANT AUTOREGULATION **c51**
I. I. Tkatchenko *In its* Geosystem Studies for Monitoring 1981 p 124-130 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

Determination of optical radiation energy expenses for plant autoregulation is presented. A method of determination of photosynthetically efficient optical radiation energy expenses for autoregulation processes of summer-corn barley which are due to varying of irradiance and air temperature is developed. This procedure may be used for construction of phytocenose productivity models. Author

N83-33254# Academy of Sciences (USSR), Moscow.
RELATION OF DYNAMICS OF SOIL MICROORGANISMS AND DYNAMICS OF UNDERGROUND PHYTOMASS **c51**
E. P. Pimenov and Hoang Chung *In its* Geosystem Studies for Monitoring 1981 p 130-134 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

Number of soil microorganisms and its seasonal dynamics correlate with the dynamics of live and dead underground phytomass in thick tchernozem soils of Streletsky part of the Central Tchernozem nature reserve. Number of bacteria increases in parallel with live underground phytomass. Number of fungi is in negative correlation with the quantity of dead underground phytomass. Number of actinomycetes has a specific dynamics with the maximum at the end of vegetation period. Observed correlation may be used in the monitoring of the soil block of geosystems. Author

N83-33255# Academy of Sciences (USSR), Moscow.
FUNCTIONAL STRUCTURE OF SOME NORTHERN STEPPE PHYTOCENOSES **c51**
N. A. Cibanova *In its* Geosystem Studies for Monitoring 1981 p 134-147 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

On the base of quantitative investigations of 8 Northern steppe phytocenoses conclusion are made about functional structure of phythocenoses and spatial distribution of species with various ecobiomorphology. Correlation of coenopopulations of species indicate type of internal coenotie structure. Author

N83-33256# Academy of Sciences (USSR), Moscow.
USE OF BIOGEOPHYSICAL OBSERVATION METHODS FOR THE MONITORING OF STATUS AND PRODUCTION OF AGROPHYTOCENOSE **c43**
V. V. Kolomeithenko *In its* Geosystem Studies for Monitoring 1981 p 148-155 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

For labor efficiency during field investigations accelerative method of determination blud leaves area is proposed and technique of measuring underground phytomass is improved. The most complete energy agrophytocenose characteristic must be given with using two coefficients: coefficients of PhAR utilization in the space (generally used efficiency of PhAR) and coefficient of utilization PhAR during of time. B.W.

N83-33257# Academy of Sciences (USSR), Moscow.
MONITORING OF CHLOROPHYLL CONTENT IN FOREST-STEPPE PHYTOCENOSES BY REMOTE SENSING METHODS **c51**
I. Ph. Petrova *In its* Geosystem Studies for Monitoring 1981 p 155-160 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

Remote-sensing procedure of determination of chlorophyll content in forest-steppe canopy is developed. Chlorophyll is determinated from optical density of negative air-photograph in three zones of spectrum: 0,48-0,60 mcm (yellow-green zone); 0,60-0,68 mcm (orange zone); 0,70-0,76 mcm (near IR-zone), by using linear equations of regression. Author

N83-33258# Academy of Sciences (USSR), Moscow.
A CORRECT METHOD OF CALCULATING ANALYTICAL DATA FOR BIOGEOCHEMICAL MONITORING **c25**
M. N. Yakovleva *In its* Geosystem Studies for Monitoring 1981 p 160-166 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

To make the data of chemical analysis of soils comparable, it is proposed to express the data as procents of undried as well as of dried matter, and take into account soil composition of mechanical fractions. Author

N83-33259# Academy of Sciences (USSR), Moscow.
USING OF ORIENTED GRAPHS OF SIMILARITY FOR MONITORING OF VEGETATION DYNAMICS **c43**
P. N. Melancholin *In its* Geosystem Studies for Monitoring 1981 p 167-173 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

Using the method of oriented graphs of similarity the reestablishment of vegetation, irradiated by different dozes of ionizing radiation is estimated. Levelling of differences between forest phytocenoses in conditions of long-existing nature reserve is described. Author

N83-33260# Academy of Sciences (USSR), Moscow.
TWO PROGRAMS FOR QUANTITATIVE ANALYSIS OF THE DATA OF GEOBOTANICAL MAPPING FOR NEEDS OF MONITORING **c61**
A. S. Kondrashov and V. G. Oniptchenko *In its* Geosystem Studies for Monitoring 1981 p 173-181 In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

An algorithm for calculation of degree of difference between geobotanic descriptions and for analysis of disposition of similar descriptions during entire geobotanic mapping is proposed. A FORTRAN computer program is used. B.W.

N83-33261# Academy of Sciences (USSR), Moscow.
PLANT TERATA AS AN INDICATOR FOR GEOSYSTEM MONITORING WITH SPECIAL REFERENCE TO WESTERN TIAN-SHAN **c43**
A. A. Ivastschenko *In its* Geosystem Studies for Monitoring 1981 p 181-195 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

Results of many-year observation on terathology of 21 ephemeroid species of family Liliaceae in West Tien-Shan (natural reserve Aksu-Dzhabagly and surrounding areas) are represented Conditions for formation of anomalies of distinct elements of flower, leaf and stem are characterized. From analysis of ferata number variation during time of observation conclusions

are made about influence of weather conditions during formation of buds and site changes due to antropogeneous activities on teratogenesis. Author

N83-33262# Meteorological Satellite Center, Tokyo (Japan).
SUMMARY OF TOVS DATA PROCESSING SYSTEM
Mar. 1983 155 p refs In JAPANESE; ENGLISH summary
(ISSN-0388-9553) Avail: NTIS HC A08/MF A01

Several areas of the TOVS (TIROS Operational Vertical Sounder) are addressed including data processing, editing and calibration of HRPT (High Resolution Picture Transmission), meteorological parameters, sea surface temperature, and coding and archiving of atmospheric parameter retrieval data. For individual titles, see N83-33263 through N83-33273.

N83-33263# Meteorological Satellite Center, Tokyo (Japan).
OUTLINE OF THE TOVS DATA PROCESSING SYSTEM c47
Tadao Aoki *In its* Sum. of TOVS Data Process. System Mar. 1983 p 1-10 refs In JAPANESE; ENGLISH summary (For primary document see N83-33262 21-42)
Avail: NTIS HC A08/MF A01

An outline of the sounding instruments of TIROS-N, and the theoretical background of the retrieval of the atmospheric temperature, moisture, and other parameters are summarized. Author

N83-33264# Meteorological Satellite Center, Tokyo (Japan).
RECEIVING AND MAGNETIC TAPE RECORDING OF ORIGINAL HRPT DATA c35
Toyoji Takayama *In its* Sum. of TOVS data Process. System Mar. 1983 p 11-24 refs In JAPANESE; ENGLISH summary (For primary document see N83-33262 21-42)
Avail: NTIS HC A08/MF A01

The TIROS-N/NOAA-A-J series have introduced the polar orbital environmental satellite system from 1978. The satellites transmit AVHRR (Advanced Very High Resolution Radiometer) image data, low data rate instruments data (TOVS data, etc) and spacecraft/instrument telemetry data as the HRPT (High Resolution Picture Transmission). At the MSC (Meteorological Satellite Center), the HRPT signal which is transmitted by S-band from satellite is received in 4 m phi parabola antenna, low noise amplifier, and converted into the analog image data. The received signal is recorded on the computer compatible tapes for TOVS processing. Author

N83-33265# Meteorological Satellite Center, Tokyo (Japan).
EDITING AND CALIBRATION OF HRPT DATA c82
Shinobu Nakajima and Tadao Aoki *In its* Sum. of TOVS Data Process. System Mar. 1983 p 25-48 ref In JAPANESE; ENGLISH summary (For primary document see N83-33262 21-42)
Avail: NTIS HC A08/MF A01

The originally received HRPT data is first stored, with no calibration, in 1600 BPI/2400 ft magnetic tapes (MT) of four volume maximum by mini computer. These tapes are next accessed by large computer, where the AVHRR and TOVS are separately stored into a AVHRP data file and TOVS data file, respectively, after a calibration. Here, only the data of one channel of AVHRR are stored. In the process of the calibration the digital counts are converted to the radiances. The original HRPT data is archived in 6250 BPI/2400 ft MT of one volume with the same format as 1600 BPI MT. Author

N83-33266# Meteorological Satellite Center, Tokyo (Japan).
ORBIT PREDICTION FOR TIROS-N SATELLITE SERIES c13
Shinobu Nakajima and Tadao Aoki *In its* Sum. of TOVS Data Process. System Mar. 1983 p 49-55 ref In JAPANESE; ENGLISH summary (For primary document see N83-33262 21-42)
Avail: NTIS HC A08/MF A01

Software system of orbit prediction for TIROS-N satellite series consists of three modules. The first is the extraction of orbital data for only one orbit, which are transmitted from NOAA/NESS on daily base through GTS (Global Telecommunications Service). The second is the orbit prediction for orbits of 7 days using the one orbital data mentioned above. The predictions of orbits is also made on daily base. In the last module the one orbital data retained through GTS is archived in a disk file for a month, which is further archived in magnetic tape. Author

N83-33267# Meteorological Satellite Center, Tokyo (Japan).
DETERMINATION OF THE LOCATION AND PARTIAL CLOUD AMOUNT IN EACH HIRS SPOT c47
Tadao Aoki and Shinobu Nakajima *In its* Sum. of TOVS Data Process. System Mar. 1983 p 57-66 refs In JAPANESE; ENGLISH summary (For primary document see N83-33262 21-42)
Avail: NTIS HC A08/MF A01

In one HIRS (High Resolution Infrared Radiometer Sounder) spot 300 to 450 AVHRR pixels are contained. In the TOVS data processing system of MSC, the partial cloud amount in a HIRS spot is determined by counting the number of the cloudy pixels of AVHRR within the HIRS spot. For the navigation of AVHRR pixels within a HIRS spot it is necessary to know the relationship of the location of HIRS spots and AVHRR pixels. For the determination of the latitude and longitude of the HIRS spots, it is further necessary to match the AVHRR picture to land marks. Author

N83-33268# Meteorological Satellite Center, Tokyo (Japan).
DETERMINATION OF THE VERTICAL TEMPERATURE, MOISTURE, CLOUD-TOP-HEIGHT AND OTHER METEOROLOGICAL PARAMETERS c47
Tadao Aoki and Shinobu Nakajima *In its* Sum. of TOVS Data Process. System Mar. 1983 p 67-104 refs In JAPANESE; ENGLISH summary (For primary document see N83-33262 21-42)
Avail: NTIS HC A08/MF A01

In TOVS data processing system of MSC, the vertical temperature profile, vertical precipitable water profile, ground and sea surface temperature, ozone amount, cloud top height, cloud amount, cloud emissivity, etc were obtained. The procedures and techniques to obtain these meteorological parameters are described, which involve the method of clear radiance retrieval, inversion method, angular correction and quality control. The methods of clear radiance retrieval and angular correction are greatly different with those of NESS/NOAA. Author

N83-33269# Meteorological Satellite Center, Tokyo (Japan).
OBJECTIVE ANALYSIS OF SEA SURFACE TEMPERATURE c48
Tadao Aoki and Shinobu Nakamina *In its* Sum. of TOVS Data Process. System Mar. 1983 p 105-110 refs In JAPANESE; ENGLISH summary (For primary document see N83-33262 21-42)
Avail: NTIS HC A08/MF A01

The initial guess value of the sea surface temperature is the basic data for creating the initial clear radiance field of HIRS and initial clear radiance field of AVHRR in fine mesh points, to be used in the next TOVS data processing. In this article, a method to interpolate the sea surface temperature at grid points has been shown from the data of the retrieved sea surface temperature in the APRET (Atmospheric Parameter RETrieval) file, with the use of the technique of objective analysis. Author

N83-33270# Meteorological Satellite Center, Tokyo (Japan).
UPDATE OF INITIAL VALUES c47
Tadao Aoki and Shinobu Nakajima *In its* Sum. of TOVS Data Process. System Mar. 1983 p 111-121 refs In JAPANESE; ENGLISH summary (For primary document see N83-33262 21-42)
Avail: NTIS HC A08/MF A01

TOVS data processing system of MSC uses three kinds of the initial values; (1) AVHRR clear radiances, which are used in determining the cloudy pixel of AVHRR within a HIRS spot; (2) the initial values of clear radiances of HIRS channels, which are used in clear radiance retrieval of HIRS channels; (3) the initial vertical profiles of temperature and moisture, which are used in the calculation of initial clear radiances of AVHRR and HIRS stated above or in the retrieval of the vertical profiles by the method of so-called initial value method. The procedure to create these initial values, with the use of data of the surface temperature obtained from the TOVS data processing system of MSC, and the data of vertical temperature and moisture profiles of National Meteorologi-

cal Center of America obtained through the Global Telecommunication System are described. Author

N83-33271# Meteorological Satellite Center, Tokyo (Japan).
ON THE DATA COMPILATION FOR THE DETERMINATION OF THE REGRESSION COEFFICIENT **c47**
Shinobu Nakajima and Tadao Aoki *In its* Sum. of TOVS Data Process. System Mar. 1983 p 123-131 In JAPANESE; ENGLISH summary (For primary document see N83-33262 21-42)
Avail: NTIS HC A08/MF A01

The regression coefficient for the calculation of the meteorological parameters such as the vertical temperature and moisture is determined from the coincident data of radiance and sonde or ship data. The procedure of the compilation of these coincident data is described. Author

N83-33272# Meteorological Satellite Center, Tokyo (Japan).
DETERMINATION OF THE REGRESSION COEFFICIENTS **c47**
Tadao Aoki and Shinobu Nakajima *In its* Sum. of TOVS Data Process. System Mar. 1983 p 133-140 refs In JAPANESE; ENGLISH summary (For primary document see N83-33262 21-42)
Avail: NTIS HC A08/MF A01

Theoretical background is described for the formulation of the functional form of the angular dependent regression coefficients which are used to calculate the vertical temperature profile, vertical water vapor profile, sea or ground surface temperature, and total ozone amount, from satellite observed radiances. The kind of categories of coefficient and the technique to determine the coefficient are also described. Author

N83-33273# Meteorological Satellite Center, Tokyo (Japan).
CODING AND ARCHIVING OF ATMOSPHERIC PARAMETER RETRIEVAL DATA **c47**
Shinobu Nakajima and Tadao Aoki *In its* Sum. of TOVS Data Process. System Mar. 1983 p 141-156 In JAPANESE; ENGLISH summary (For primary document see N83-33262 21-42)
Avail: NTIS HC A08/MF A01

The function of the first module is to create the coded data to transmit to the Head Quarters of Japan Meteorological Agency (JMA). These are the geopotential height, precipitable water and sea surface temperature in SATEM code and the atmospheric temperature and the relative humidity in TEMP TOVS code that is very similar to TEMP SHIP code. The function of the second module is to archive, in magnetic tape, the data which are stored in the TOVS data file, the Cloud Information and Location file and the Atmospheric Parameter Retrieval file. The function of last module is to archive in magnetic tape, the data which is stored the TOVS Sea Surface Temperature file. Author

N83-33274# Nagoya Univ. (Japan). Research Inst. of Atmospherics.
PROCEEDINGS OF THE RESEARCH INSTITUTE OF ATMOSPHERICS, NAGOYA UNIVERSITY, VOLUME 30
T. Kamada, ed., M. Takagi, ed., S. Enome, ed., A. Iwai, ed., T. Nakai, ed., T. Kakinuma, ed., and J. Ohtsu, ed. Mar. 1983 117 p refs
(ISSN-0077-264X) Avail: NTIS HC A06/MF A01

Progress and proceedings for research in atmospherics are presented. Topics inlcude: analysis of solar occultatioon measurements; VHF direction finder to locate lightning at close range; laser radar for observation of minor atmospheric constituents in the stratosphere; observation system of cosmic radio noise absorption; receiver and control for 10-m diameter antennas; high gain, broadband, steerable, decametetric array for Jovian radio emission observation; investigation of ELF-VLF electromagnetic environment; digital phase driver radio heliograph. For individual titles, see N83-33275 through N83-33281.

N83-33275# Nagoya Univ. (Japan).
A METHOD OF ANALYSIS IN THE SOLAR OCCULTATION MEASUREMENTS **c46**
Masumi Takagi and Yutaka Kondo *In* Nagoya Univ. Proc. of the Res. Inst. of Atmospherics, Nagoya Univ., Vol. 30 Mar. 1983 p 1-14 refs (For primary document see N83-33274 21-42)
Avail: NTIS HC A06/MF A01

A practical technique which is applicable to the analysis of solar occultation measurements is described. The densities of aerosol and ozone in the lower stratosphere were measured by balloonborne Sun photometers for solar occultation reducing the observed optical depth to the extinction profile. Analytical procedures were improved. It is emphasized that the effect of refraction and absorption of sunlight in the atmosphere should be estimated accurately. E.A.K.

N83-33276# Nagoya Univ. (Japan).
VHF DIRECTION FINDER FOR LOCATING LIGHTNINGS AT CLOSE RANGES **c47**
Hirokazu Yamashita, Akira Iwai, Mitsugi Satoh, and Toshio Katoh *In* Nagoya Univ. Proc. of the Res. Inst. of Atmospherics, Nagoya Univ., Vol. 30 Mar. 1983 p 15-24 refs Sponsored in part by the Japanese Ministry of Education (For primary document see N83-33274 21-42)
Avail: NTIS HC A06/MF A01

A new VHF direction finding (DF) system using Rocke type Adcock antenna was developed to locate nearby lightnings with a bearing error less than 2 deg. The DF results show that the locations of lightnings are distributed within the region of a causative thundercloud, at ranges less than 120 km. E.A.K.

N83-33277# Nagoya Univ. (Japan).
A LASER RADAR SYSTEM FOR THE OBSERVATION OF MINOR ATMOSPHERIC CONSTITUENTS IN THE STRATOSPHERE **c46**
Akira Iwata, Yutaka Kondo, and Masumi Takagi *In* Nagoya Univ. Proc. of the Res. Inst. of Atmospherics, Nagoya Univ., Vol. 30 Mar. 1983 p 25-35 refs (For primary document see N83-33274 21-42)
Avail: NTIS HC A06/MF A01

A laser radar system was constructed to observe aerosols and minor atmospheric gas constituents in the stratosphere. The system is composed of a combination of YAG and dye lasers. The YAG laser is used for observing the density distribution of aerosols and to obtain information on size distribution of aerosols. The dye laser, which is pumped by the YAG laser, is used for gaseous constituents such as ozone by applying the DIAL method. A mini computer controls the system operation. The composition of the system and some examples of preliminary aerosol observations are described and the sensitivity of the system is estimated. E.A.K.

N83-33278# Nagoya Univ. (Japan).
AN OBSERVATION SYSTEM OF COSMIC RADIO NOISE ABSORPTION BY RIOMETERS USING CORNER-REFLECTOR ANTENNAS **c93**
Masanori Nishino, Yoshihito Tanaka, Yasuo Katoh, and Akira Iwai *In* Nagoya Univ. Proc. of the Res. Inst. of Atmospherics, Nagoya Univ., Vol. 30 Mar. 1983 p 37-47 refs Sponsored in part by the Japanese Ministry of Education (For primary document see N83-33274 21-42)
Avail: NTIS HC A06/MF A01

The observation system of cosmic radio noise absorption in the ionosphere by Riometers using corner reflector antennas is described. Two sets of the corner reflector antenna for the observing frequencies of 30 and 60MHz were installed. One antenna set is directed towards the Pole star and the other in parallel to the Earth's magnetic field. An example of preliminary observation results is presented. E.A.K.

N83-33279# Nagoya Univ. (Japan).
NEW RECEIVER AND CONTROL SYSTEM FOR 10-m DIAMETER ANTENNA **c32**
Katsumi Tsukamoto, Chikayoshi Torii, and Shinzo Enome *In* Nagoya Univ. Proc. of the Res. Inst. of Atmospherics, Nagoya Univ., Vol. 30 Mar. 1983 p 49-60 refs (For primary document see N83-33274 21-42)
Avail: NTIS HC A06/MF A01

A new feed, front-end receiver, backend receiver, a data acquisition system, and control system for 10-m diameter dish at Toyokawa are described. Observation results of the Sun and signals from geostationary satellites are shown. E.A.K.

N83-33280# Nagoya Univ. (Japan).
A HIGH-GAIN, BROADBAND, STEERABLE, DECAMETRIC ARRAY TO OBSERVE JOVIAN RADIO EMISSION: A 4-ELEMENT ARRAY c93
Takashi Watanabe, Tetsuo Kamada, Tatsuki Ogino, Hidehiko Jindo, Susumu Tkuda, and Koichi Ota *In* Nagoya Univ. Proc. of the Res. Inst. of Atmospherics, Nagoya Univ., Vol. 30 Mar. 1983 p 61-69 refs Sponsored in part by Japanese Ministry of Education (For primary document see N83-33274 21-42)
Avail: NTIS HC A06/MF A01

A broadband array of four conical log spiral antenna was constructed as the prototype of a large array to observe Jovian decametric emission. Covered frequency range is 20 approx. 100 MHz. The beam of the array can be steered by time delay line and is therefore frequency independent. Each log spiral antenna has similar efficiency as compared with that of a typical dipole. Two examples of spectral observations of Jovian decametric emission are also shown. E.A.K.

N83-33281# Nagoya Univ. (Japan).
A DIGITAL PHASE DRIVER FOR THE SWEPT-LOBE LAMBDA 8-CM RADIOHELIOGRAPH c33
Chikayoshi Torii *In* Nagoya Univ. Proc. of the Res. Inst. of Atmospherics, Nagoya Univ., Vol. 30 Mar. 1983 p 79-84 refs In JAPANESE; ENGLISH summary (For primary document see N83-33274 21-42)
Avail: NTIS HC A06/MF A01

The lambda 8-cm radioheliograph at Toyokawa is a beam forming type radio interferometer. To scan the Sun by this type of interferometer, it is necessary to shift the phase of the output from each antenna, proportional to the distance between the relevant antenna and the phase center of the interferometer. For this purpose, a digital phase driver was developed. The lambda 8-cm radioheliograph has 52 sets of digital phase shifters with 256 steps of 1.4 degree resolution. The present phase driver uses programmable read only memory (PROM), and covers the wide range of sweeping frequencies from 0 tc 50 scan/sec. This driver can be applied to various kinds of arrays by rewriting the PROM and can be controlled by microcomputers. E.A.K.

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

N83-33282 Royal Aircraft Establishment, Farnborough (England).
SPINE: A PAPER PRESENTED TO THE INTERNATIONAL SOCIETY OF PHOTOGRAMMETRY AND REMOTE SENSING ON THE APPLICATION AGRISPINE
K. Green Jan. 1983 13 p refs Conf. held at Ottawa, Aug. 1982 Sponsored by ESA SPINE coordination ESTEC, ESA Earthnet Program Office ESRIN, Swedish Space Corp., Dundee Univ., United Kingdom, and Interim EUTELSAT
(RAE-TM-SPACE-316; BR87189) Copyright. Avail: Issuing Activity

The SPINE project, which investigates the suitability of satellite links for transferring bulk digital data at megabit rates between small customer-located Earth stations, and AGRISPINE (long term monitoring of crop and forest growth in the UK) are introduced. Test sites in Scotland, England, Greenland (iceberg formation) and the Gulf of Finland (ice formation) are discussed. Data transmission, post processing, and aerial photography and ground truth are mentioned. Author (ESA)

N83-33283*# Arkansas Univ., Fayetteville. Dept. of Electrical Engineering.
DATA DOCUMENTATION FOR THE BARE SOIL EXPERIMENT AT THE UNIVERSITY OF ARKANSAS Technical Report, 9 Jul. - 19 Oct. 1979
William P. Waite, Hubert D. Scott, Principal Investigators, and Gary D. Hancock Jan. 1980 209 p refs Sponsored by NASA, USDA, Dept. of Commerce, Dept. of Interior, and Agency for International Development ERTS
(Contract NAS9-14251; Proj. AgRISTARS)
(E83-10392; NASA-CR-171626; SM-AO-04008; NAS 1.26:171626)
Avail: NTIS HC A10/MF A01 CSCL 02C

The reflectivities of several controlled moisture test plots were investigated. These test plots were of a similar soil texture which was clay loam and were prepared to give a desired initial soil moisture and density profile. Measurements were conducted on the plots as the soil water redistributed for both long term and diurnal cycles. These measurements included reflectivity, gravimetric and volumetric soil moisture, soil moisture potential, and soil temperature. Author

N83-33284*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THEMATIC MAPPER IMAGE QUALITY: PRELIMINARY RESULTS
Robert C. Wrigley, Donald H. Card, Christine A. Hlavka, William C. Likens, Frederick C. Mertz, and Jeff R. Hall 1983 7 p refs Presented at the Intern. Geosci. and Remote Sensing Symp., San Francisco, 31 Aug. - 2 Sep. 1983 Sponsored by NASA Prepared in cooperation with Technicolor Government Services, Inc., Moffett Field, Calif. Original photography may be purchased from EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(E83-10393; NASA-TM-85256; NAS 1.15:85256) Avail: NTIS HC A02/MF A01 CSCL 05B

Based on images analyzed so far, the band to band registration accuracy of the thematic mapper is very good. For bands within the same focal plane, the mean misregistrations are well within the specification, 0.2 pixels. For bands between the cooled and uncooled focal planes, there is a consistent mean misregistration of 0.5 pixels along-scan and 0.2-0.3 pixels across-scan. It exceeds the permitted 0.3 pixels for registration of bands between focal planes. If the mean misregistrations were removed by the data processing software, an analysis of the standard deviation of the misregistration indicates all band combinations would meet the registration specifications except for those including the thermal band. Analysis of the periodic noise in one image indicates a noise component in band 1 with a spatial frequency equivalent to 3.2 pixels in the along-scan direction. A.R.H.

N83-33285*# Arizona Univ., Tucson. Remote Sensing Center.
MTF ANALYSIS OF LANDSAT-4 THEMATIC MAPPER
Robert Schowengerdt [1983] 5 p refs Sponsored by NASA ERTS
(E83-10394; NASA-CR-172936; NAS 1.26:172936) Avail: NTIS HC A02/MF A01 CSCL 05B

The spatial radiance distribution of a ground target must be known to a resolution at least four to five times greater than that of the system under test when measuring a satellite sensor's modulation transfer function. Calibration of the target requires either the use of man-made special purpose targets with known properties, e.g., a small reflective mirror or a dark-light linear pattern such as line or edge, or use of relatively high resolution underflight imagery to calibrate an arbitrary ground scene. Both approaches are to be used in addition a technique that utilizes an analytical model for the scene spatial frequency power spectrum is being investigated as an alternative to calibration of the scene. A.R.H.

N83-33286*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
ASSESSMENT OF THEMATIC MAPPER BAND-TO-BAND REGISTRATION BY THE BLOCK CORRELATION METHOD
Don H. Card, Robert C. Wrigley, Frederick C. Mertz, and Jeff R. Hall [1983] 12 p refs Sponsored by NASA Prepared in

cooperation with Technicolor Government Services, Inc., Moffett Field, Calif. ERTS
(E83-10397; NASA-TM-85257; NAS 1.15:85257) Avail: NTIS HC A02/MF A01 CSCL 05B

Rectangular blocks of pixels from one band image were statistically correlated against blocks centered on identical pixels from a second band image. The block pairs were shifted in pixel increments both vertically and horizontally with respect to each other and the correlation coefficient to the maximum correlation was taken as the best estimate of registration error for each block pair. For the band combinations of the Arkansas scene studied, the misregistration of TM spectral bands within the noncooled focal plane lie well within the 0.2 pixel target specification. Misregistration between the middle IR bands is well within this specification also. The thermal IR band has an apparent misregistration with TM band 7 of approximately 3 pixels in each direction. The TM band 3 has a misregistration of approximately 0.2 pixel in the across-scan direction and 0.5 pixel in the along-scan direction, with both TM bands 5 and 7. A.R.H.

N83-33287*# Ohio State Univ., Columbus.
ON THE GEODETIC APPLICATIONS OF SIMULTANEOUS RANGE-DIFFERENCING TO LAGEOS Final Report
Erricos C. Pablis Dec. 1982 229 p refs
(Contract NAS5-25888)
(NASA-CR-170566; NAS 1.26:170566; Rept-338) Avail: NTIS HC A11/MF A01 CSCL 08B

The possibility of improving the accuracy of geodetic results by use of simultaneously observed ranges to Lageos, in a differencing mode, from pairs of stations was studied. Simulation tests show that model errors can be effectively minimized by simultaneous range differencing (SRD) for a rather broad class of network satellite pass configurations. The methods of least squares approximation are compared with monomials and Chebyshev polynomials and the cubic spline interpolation. Analysis of three types of orbital biases (radial, along- and across track) shows that radial biases are the ones most efficiently minimized in the SRC mode. The degree to which the other two can be minimized depends on the type of parameters under estimation and the geometry of the problem. Sensitivity analyses of the SRD observation show that for baseline length estimations the most useful data are those collected in a direction parallel to the baseline and at a low elevation. Estimating individual baseline lengths with respect to an assumed but fixed orbit not only decreases the cost, but it further reduces the effects of model biases on the results as opposed to a network solution. Analogous results and conclusions are obtained for the estimates of the coordinates of the pole. Author

N83-33288# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
THE GERMAN-AUSTRIAN DOPPLER CAMPAIGN [DIE DEUTSCHE-OESTERREICHISCHE DOPPLERKAMPAGNE]
1982 130 p refs In GERMAN
(Ser-B-260-Mitt-164; ISSN-0071-9196) Avail: NTIS HC A07/MF A01

Doppler positioning measurements at stations in West Germany and Austria were performed in order to improve classical topographical measurements. Meteorological parameters are observed. A mathematical model for data evaluation is discussed. Calibration measurements of different Doppler receiver systems are performed. The choice of station coordinates weights in the calculations is discussed. The data processing of the measurement data is considered. Doppler and terrestrial coordinates are compared. For individual titles, see N83-33289 through N83-33297.

N83-33289# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
THE CONCEPT OF THE GERMAN-AUSTRIAN DOPPLER OBSERVATION CAMPAIGN (DODOC) [DAS KONZEPT DER DEUTSCHE-OESTERREICHISCHEN E (DODOC)]
K. Rinner and H. Seeger *In its* The German-Austrian Doppler Campaign 1982 p 5-11 refs In GERMAN Sponsored by Oesterreichischen Fonds zur Foerderung der wissenschaftlichen Forschung (For primary document see N83-33288 21-43)
Avail: NTIS HC A07/MF A01

Doppler positioning measurements at 21 uniformly distributed stations in Germany and Austria were performed in order to investigate whether Doppler measurements can improve the classical topographical measurements. Multipoint determination and other simultaneous methods; verification of the error structure of terrestrial main triangultion grids; parameter calculation for a global Doppler reference system; and calculation of geocentric three-dimensional coordinates are studied. Author (ESA)

N83-33290# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
MEASUREMENTS AND STATION REPORTS [MESSUNGEN UND STATIONSBERICHTE] **c47**
Guenter Seeber *In its* The German-Austrian Doppler Campaign 1982 p 13-36 In GERMAN (For primary document see N83-33288 21-43)
Avail: NTIS HC A07/MF A01

Results of satellite Doppler meteorological observations carried out at 22 stations in West Germany and Austria from 17 May 1977 till 6 June 1977 are presented. Atmospheric pressure and temperature, and relative air humidity were measured. A data sheet is presented for each station showing experimental setup, centering elements of the Doppler antenna, and observation period. Author (ESA)

N83-33291# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
MATHEMATICAL MODEL FOR THE EVALUATION OF DOPPLER MEASUREMENTS [MATHEMATISCHES MODELL ZUR AUSWERTUNG VON DOPPLERMESSUNGEN] **c64**
Wolfgang Schlueter and Peter Pesec *In its* The German-Austrian Doppler Campaign 1982 p 37-54 refs In GERMAN (For primary document see N83-33288 21-43)
Avail: NTIS HC A07/MF A01

The mathematical model on which the computer program system GEODOP for the evaluation of simultaneous Doppler measurements at several stations is based, is presented. The basic theory of the model is explained. The calculated unknowns are the station coordinates and an error model parameter. The program GEODOP enables observations of the different stations to be weighed and takes into consideration correlations between neighboring Doppler counts. Ionospheric and tropospheric refraction are corrected. Height accuracy is 0.2 m. Author (ESA)

N83-33292# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
CALIBRATION OF DOPPLER RECEIVERS [KALIBRIERUNG VON DOPPLEREMPFAENGERN] **c32**
Wolfgang Schlueter and Peter Pesec *In its* The German-Austrian Doppler Campaign 1982 55-60 ref In GERMAN (For primary document see N83-33288 21-43)
Avail: NTIS HC A07/MF A01

Calibration measurements of different Doppler receiver systems were performed in order to eliminate instrument differences between the phase centers of Doppler antennas. The measurements are quantitatively equivalent and show that the use of different instruments and antennas requires extensive verification and calibration of the phase center heights. If the phase center of the transportable Canadian Marconi (CMA) receiver 722B is taken as reference, a height correction of 1 m with respect to the factory specifications is necessary for the CMA 722B naval antenna and for the Magnarox 702A antennas. Author (ESA)

N83-33293# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
SOME QUESTIONS ABOUT THE EVALUATION BY COMPUTER [EINIGE FRAGEN IM ZUSAMMENHANG MIT DER RECHNERISCHEN AUSWERTUNG] **c61**

P. Meissl *In its* The German-Austrian Doppler Campaign 1982 p 61-66 ref In GERMAN (For primary document see N83-33288 21-43)
Avail: NTIS HC A07/MF A01

Questions about the weight factors of Doppler observations of different stations in the computer program GEODOP are discussed in order to solve the problem of discrepancies in the computer evaluation. Station coordinates weights are assumed from the beginning of the calculation and are not estimated further during the calculation. The percentage (4%) of rejected Doppler counts is too high. The fact that double precision was not systematically used in all calculations can lead to discrepancies. A small covariance matrix of the station coordinates is not a good criterion for weight factors choice. A better weight criterion is a weight unity error of one. The influence of translocation in the weight factors could be slightly weakened in favor of a higher absolute accuracy. Author (ESA)

N83-33294# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
GERMAN-AUSTRIAN DOPPLER CAMPAIGN DODOC: EVALUATION AND RESULTS [DEUTSCH-OESTERREICHISCHE DOPPLERKAMPAGNE DODOC AUSWERTUNG UND ERGEBNISSE]
Peter Pesec and Wolfgang Schlueter *In its* The German-Austrian Doppler Campaign 1982 p 67-89 refs In GERMAN (For primary document see N83-33288 21-43)
Avail: NTIS HC A07/MF A01

Doppler positioning data were evaluated and geocentric coordinates for 24 stations were determined. Processing of measurement data is described. Doppler coordinate determination by the program GEODOP, and block compensation of five simultaneously measured geographical blocks, are treated. Doppler coordinates of the 24 stations are represented in tables. Author (ESA)

N83-33295# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
COMPARISON BETWEEN THE DODOC RESULTS FOR GERMANY AND TERRESTRIAL COORDINATES [VERGLEICHE DER DODOC-ERGEBNISSE (DEUTSCHER ANTEIL) MIT TERRESTRISCHEN KOORDINATEN]
Wolfgang Schlueter *In its* The German-Austrian Doppler Campaign 1982 p 91-111 refs In GERMAN (For primary document see N83-33288 21-43)
Avail: NTIS HC A07/MF A01

The Doppler coordinates of the DODOC German stations and one Austrian station were compared with different series of terrestrial coordinates. The comparison shows a surprisingly good agreement in the relative position of the points. The geodetic grids obtained by simultaneous Doppler measurements reach the quality of the classical grids for point distances between 100 and 200 km, even without knowledge of the precise ephemeris. Apart from weather independence and automation oriented data evaluation, the Doppler method also provides three dimensional coordinates. Author (ESA)

N83-33296# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
COMPARISON BETWEEN DODOC RESULTS FOR AUSTRIA AND TERRESTRIAL COORDINATES [VERGLEICH DODOC-ERGEBNISSE MIT TERRESTRISCHEN KOORDINATEN (OESTERREICHISCHER ANTEIL)]
Karl Rinner *In its* The German-Austrian Doppler Campaign 1982 p 113-128 refs In GERMAN (For primary document see N83-33288 21-43)
Avail: NTIS HC A07/MF A01

The Doppler coordinates of the DODOC Austrian stations were compared with different series of terrestrial coordinates. Depending on the terrestrial coordinate system, discrepancies from + or - 28 cm upto + or - 201 cm are found. Author (ESA)

N83-33297# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
FINAL CONCLUSIONS AND PROSPECTS [SCHLUSSFOLGERUNGEN UND AUSBLICK]
K. Rinner, G. Seeber, and H. Seeger *In its* The German-Austrian Doppler Campaign 1982 p 129-130 In GERMAN (For primary document see N83-33288 21-43)
Avail: NTIS HC A07/MF A01

The DODOC Doppler positioning measurements and prospects are reviewed. An efficient point determination procedure is developed, characterized by simultaneous measurements in regional overlapping areas and by a combined compensation of the different data. The error structure of the German and Austrian main triangulation grids is revealed. Doppler system accuracy is + or - 0.3 to 0.5 m, and is limited by technology, geometrical system configuration, meteorological effects, calculation system, and different computer organization in the different stations. A better accuracy of the Doppler coordinates is possible by an improvement of orbit determination, technology, and data evaluation. Author (ESA)

N83-33298# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany). Working Group Triangulation.
THE 1980 DIAGNOSTIC ADJUSTMENT OF THE GERMAN PRIMARY TRIANGULATION ELEMENT. PART 1: DATA AND DIRECTIONS [DIE DAIGNOSEAUSGLEICHUNG 1980 DES DEUTSCHEN HAUPTDREIECKSNETZES. 1: PROBLEMSTELLUNG, RICHTUNGEN]
Rudolf Schmidt and Dieter Ehlert 1982 428 p refs In GERMAN; ENGLISH summary Document has large chart
(Ser-B-262-Mitt-165-Pt-1; ISSN-0071-9196) Avail: NTIS HC A19/MF A01

The development of the German primary triangulation in the period from 1869 till 1979, and of the diagnostic adjustment of 297 primary triangulation points are discussed. Direction measurements (from 1864 till 1969) for the diagnostic adjustment are reviewed. Points, directions, and deviations between geodetic and astronomical-geographic coordinates are listed for the different stations. For individual titles, see N83-33299 through N83-33300.

N83-33299# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany). AdV Working Group Triangulation.
DIAGNOSTIC ADJUSTMENT OF THE GERMAN PRIMARY TRIANGULATION NETWORK: DATA [ZUR DIAGNOSEAUSGLEICHUNG DES DEUTSCHEN HAUPTDREIECKSNETZES]
Rudolf Schmidt *In its* The 1980 Diagnostic Adjustment of the German Primary Triangulation Element. Part 1: Data and Directions 1982 p 11-43 refs In GERMAN (For primary document see N83-33298 21-43)
Avail: NTIS HC A19/MF A01

The development of the German primary triangulation, and its diagnostic adjustments from 1750 onwards are reviewed. The purposes, methods of measurement and calculation, and the obtained accuracy are presented. The shortcomings of the German primary triangulation network (1955 situation) are listed. The overall diagnostic network adjustment assembles data from 1869 until 1979 from partial nets, chains, and filling-in networks. It includes all usable angle and distance measurements. The purpose is to supply more reliable data on the quality and imperfections of the net, and to provide a systematic review of the relative accuracy of the neighboring points. The net of the diagnostic adjustment contains all 297 primary triangulation points of the investigated area. Author (ESA)

N83-33300# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
THE DIRECTIONS INTRODUCED IN THE DIAGNOSTIC ADJUSTMENT OF THE GERMAN PRIMARY TRIANGULATION NETWORK [DIE IN DIE DIAGNOSEAUSGLEICHUNG DES DEUTSCHEN HAUPTDREIECKSNETZES EINGEFUEHRTEN RICHTUNGEN]
D. Ehlert *In its* The 1980 Diagnostic Adjustment of the German Primary Triangulation Element. Part 1: Data and Directions 1982 p 45-426 refs In GERMAN (For primary document see N83-33298 21-43)

Avail: NTIS HC A19/MF A01

Criteria which determine the choice of direction measurements which are sufficiently accurate and can be transferred to the diagnostic triangulation network point centers are presented. The observations were performed from 1864 till 1969 and thus include very different instruments (till 1945 mainly screw microscope theodolites, afterwards exclusively the Wild T3-theodolite). The adjusting of the different stations is explained. The observations are reduced to the Bessei ellipsoid reference plane and weighed in order to take the different observation conditions into account. Points, directions, and deviations between geodetic and astronomical-geographic coordinates are listed for the different stations.

Author (ESA)

N83-33301# Pacific Northwest Lab., Richland, Wash.

HYDROLOGIC MODELING OF THE COLUMBIA PLATEAU BASALTS

F. H. Dove, C. R. Cole, F. W. Bond, and D. A. Zimmerman Sep. 1982 13 p refs Presented at the Joint Pacific Northwest Am. Geophys. Union and Am. Assoc. for the Advan. of Sci. Meeting, Fairbanks, Alaska, 14 Sep. 1982

(Contract DE-AC06-76RL-01830)

(DE83-002045; PNL-SA-10599; CONF-820964-3) Avail: NTIS HC A02/MF A01

A technology demonstration of current performance assessment techniques as applied to a nuclear waste repository in the Columbia Plateau Basalts is discussed. Hypothetical repository coordinates were selected for an actual geographical setting on the Hanford Reservation in the state of Washington. Published hydrologic and geologic data used in the analyses were gathered in 1979 or earlier. The hydrologic simulation was divided into three major parts: (1) aquifer recharge calculations, (2) a regional hyrologic model, and (3) a local hydrologic model of the Pasco Basin. The regional model is discussed. An estimate of the amount of water transmitted through the groundwater system was required to bound the transmissivity values and to estimate the transmissivity distributions for the deeper basalts. The multiple layer two dimensional Variable Thickness Transient code was selected as appropriate for the amount of data available for the conditions existing in the regional systems. This model used a finite difference formulation to represent the partial differential flow equation. DOE

N83-33302# Rockwell International Corp., Richland, Wash. Energy Systems Group.

HYDROLOGIC STUDIES WITHIN THE PASCO BASIN

F. A. Spane, Jr. Sep. 1982 14 p refs Presented at NWTS Inform. Meeting on Basalt Waste Isolation Project, Las Vegas, Nev., 14 Dec. 1982

(Contract DE-AC06-77RL-01030)

(DE83-001749; RHO-BW-SA-251-P; CONF-821205-11) Avail: NTIS HC A02/MF A01

Hydrologic studies are being performed to provide an evaluation of groundwater systems within the Columbia River Basalt Group. These studies are focused on the Hanford Site, which is located within the Pasco Basin in south-central Washington. Hydrologic studies within the Pasco Basin involve the areal and vertical characterization of hydraulic head, hydrologic properties, and hydrochemical content for the various basalt groundwater systems. In excess of 150 test intervals were tested for hydraulic properties, while in excess of 80 horizons were analyzed for hydrochemical characteristics at about 30 borehole sites within the Pasco Basin. Data obtained from these studies provide input for numerical modeling of groundwater flow and solute transport. Results from numerical modeling are used for evaluating potential waste migration as a function of space and time. In the Pasco Basin, geologic structures influence groundwater flow patterns within basalt aquifer systems. DOE

N83-33303# Sandia Labs., Albuquerque, N. Mex.

STRATEGIC PETROLEUM RESERVE (SPR) OIL STORAGE CAVERN SULPHUR MINES 2-4-5 CERTIFICATION TESTS AND ANALYSIS. PART 1: 1981 TESTING. PART 2: 1982 TESTING

R. R. Beasley Dec. 1982 143 p refs

(Contract DE-AC04-76DP-00789)

(DE83-005347; SAND-81-2070) Avail: NTIS HC A07/MF A01

Well leak tests and a cavern pressure were conducted. The tests did not indicate conclusively that there was no leakage from the cavern, but the data indicate that cavern structural failure during oil storage is unlikely. The test results indicated that retesting and well workover were desirable prior to making a decision on the cavern use. Further tests indicated that there was no significant leakage from wells 2 and 4 ut that the leakage from wells 2A and 5 exceeded the DOE criterion. Because of the proximity of cavern 2-4-5 to the edge of the salt, this cavern should be considered for only one fill/withdrawal cycle prior to extensive reevaluation.

DOE

N83-33304# Department of Energy, Dallas, Tex. Energy Information Administration.

PRODUCTION DECLINE OF US SURVEILLANCE OIL FIELDS

J. H. Wood and M. Carrales, Jr. Aug. 1982 129 p refs

(DE83-006532; DOE/EIA-0352) Avail: NTIS HC A07/MF A01

An analysis is presented of the oil production from the larger domestic fields (surveillance fields), post-1973 fields, smaller fields and lease condensate from gas fields, and total fields at the national, state, and district level. The resulting estimates of oil production for 1981, 1982, and 1983 are included. Estimates were developed separately for the North Slope, subarctic Alaska, each of the 21 states, and for each Texas Railroad Commission district. The individual states and subarctic Alaska estimates were summed to get the subarctic US estimates. The estimates for the North Slope of Alaska were added to this sum to get the US total. DOE

N83-33305# Department of Energy, Washington, D. C. Office of Coal, Nuclear, Electric and Alternate Fuels.

NATIONAL COAL MODEL: EXECUTIVE SUMMARY

Apr. 1982 28 p refs

(DE83-006473; DOE/EIA-0325) Avail: NTIS MF A01

A simple, nontechnical description of the coal and electric utility industries as they are represented in the National Coal Model (NCM) is given. The NCM is a linear programming model used by the Department of Energy to investigate the impact of Federal and State legislation on the coal and electric utility industries and to project the production, consumption, and price of coal. This document is one of a set of four volumes of documentation describing the NCM and its operation. DOE

N83-33306# Sandia Labs., Albuquerque, N. Mex. Earth Sciences Div.

HYDROGEOCHEMICAL PARAMETERS OF FLUID-BEARING ZONES IN THE RUSTLER AND BELL CANYON FORMATIONS: WASTE ISOLATION PILOT PLANT (WIPP), SOUTHEAST NEW MEXICO (SENM)

Don Diego Gonzalez Mar. 1983 33 p refs

(Contract DE-AC04-76DP-00789)

(DE83-010418; SAND-83-0210) Avail: NTIS HC A03/MF A01

A compilation of hydrogeochemical information collected by the US Geological Survey and Sandia National Laboratories in support of the proposed Waste Isolation Pilot Plant facility is given. These data were collected as a result of field operations ongoing since 1976 and are a result of extensive observations made at 24 locations. Hydraulic testing, chemical analysis, and geophysical logging were performed in the water-bearing zones of the Rustler and Bell Canyon Formations. Transmissivities in these zones vary within nine orders of magnitude, and total dissolved solids range from a few thousand to 400,000 mg per L throughout the study area. The hydraulic data, for the most part, represent confined water-bearing horizons that range from stratigraphic contacts to 30 ft in thickness. Due to the low productivity, these zones would not be classified as acquifers anywhere else in the world. Wells within a 2-mi radius of the site and in the general SF direction of flow of the dominant aquifer in the Rustler (the Culebra Dolomite) yield no more than 0.2 gal/min over an extended period of pumping. DOE

N83-33307# Pacific Northwest Lab., Richland, Wash.
REPORT ON GEOLOGIC REMOTE SENSING OF THE COLUMBIA PLATEAU
G. A. Sandness, C. S. Kimball, K. E. Schmierer, and J. W. Lindberg May 1982 360 p refs
(Contract DE-AC06-77RL-01030)
(DE83-010201; RHO-BW-CR-133P; PNL-3140) Avail: NTIS HC A16/MF A01

The use of remote sensing to identify faults or other geologic freatures which may have a significant bearing on the structural and tectonic character of the Hanford Site and the surrounding region is discussed. LANDSAT imagery, Skylab photographs, and U-2 photographs were analyzed to identify and map geologic photolineaments in the Columbia Plateau. The LANDSAT and Skylab imagery provided a regional perspective and allowed the identification of large-scale linear features. The U-2 photography provided much greater spatial resolution as well as a stereoscopic viewing capability. This allowed identification of smaller structural or geologic features and the identification of many cultural and nongeologic lineaments detected in the LANDSAT and Skylab imagery. The area studied totals, approximately 85,000 square miles, and encompasses virtually all exposures of Columbia River Basalt in the states of Washington, Oregon, and Idaho. It also includes an area bordering the Columbia River Basalt outcrop.
DOE

N83-33308# Department of Energy, Laramie, Wyo. Energy Technology Center.
PRIMARY OIL-SHALE RESOURCES OF THE GREEN RIVER FORMATION IN THE EASTERN UINTA BASIN, UTAH
Laurence G. Trudell, John Ward Smith, Thomas N. Beard, and Glenn M. Mason Apr. 1983 138 p refs
(DE83-009081; DOE/LC/RI-82/4) Avail: NTIS HC A07/MF A01

Resources of potential oil in place in the Green River Formation were measured and estimated for the primary oil shale resource area east of the Green River in Utah's Uinta Basin. The area evaluated includes most of Utah's oil shale resource. For resource evaluation the principal oil shale section is divided into 10 stratigraphic units which are equivalent to units previously evaluated in the Piceance Creek Basin of Colorado. Detailed evaluation of individual oil shale units sampled by cores, plus estimates by extrapolation into uncored areas indicate a total resource of 214 billion barrels of shale oil in place in the eastern Uinta Basin.
DOE

N83-33309# Department of Energy, Washington, D. C. Office of Oil and Gas.
PETROLEUM RESOURCES OF THE NORTH SEA
William D. Dietzman, N. R. Rafidi, and T. A. Ross Feb. 1983 100 p refs
(DE83-010200; DOE/EIA-0381) Avail: NTIS HC A05/MF A01

The potential future oil supply capability from the North Sea was analyzed. Presented herein are estimates of: (1) original oil in place; (2) ultimate recovery; (3) remaining recoverable oil; and (4) projected supply patterns over time. It is indicated that the estimated remaining recoverable oil in the area from known deposits is about 25.6 billion barrels as of January 1, 1982, and the total undiscovered recoverable oil has an estimated statistical mean value of 19.9 billion barrels with 12.7 billion barrels of that amount occurring below the 62nd parallel. Substantial additional producing capacity might be developed, about 2.0 million barrels of oil per day and perhaps higher, especially from the United Kindgom and Norwegian sectors of the northern North Sea basin. Cumulative production to January 1, 1982, was 3.6 billion barrels, giving a total estimated ultimate oil recovery of 29.1 billion barrels and a recovery efficiency of 30.5 % of the original oil in place. From an estimated total resource base of 41.9 billion barrels of recoverable oil below the 62nd parallel, an estimated theoretical peak production rate of 4.3 million barrels of oil per day could be obtained and might occur as early as 1990. It is estimated that a theoretical peak production rate of 5.1 million barrels of oil per day might be obtained with the peak occurring in 1991.
DOE

N83-33245# Academy of Sciences (USSR), Moscow.
A SIMPLE MODEL OF PHYTOCENOSE PRODUCTIVITY AS A PART OF GEOSYSTEM FUNCTIONING LIMITED BY ENERGY
V. N. Lopatin *In its* Geosystem Studies for Monitoring 1981 p 57-60 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

N83-33246# Academy of Sciences (USSR), Moscow.
MODELLING OF A TREE CROWN AS A GEOMETRICAL FIGURE FOR THE NEEDS OF MONITORING
N. A. Iljina *In its* Geosystem Studies for Monitoring 1981 p 60-69 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

N83-33247# Academy of Sciences (USSR), Moscow.
A MODEL OF GROWTH AND PRODUCTIVITY FOR PERENNIAL PARTS OF GRASSES AND SEMIBUSH PLANTS AND ITS USE FOR MONITORING
T. S. Sidorova *In its* Geosystem Studies for Monitoring 1981 p 70-80 In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

N83-33248# Academy of Sciences (USSR), Moscow.
ON INFLUENCE OF TOPOGRAPHIC AND SOIL CONDITIONS ON FOREST SPREADING IN FOREST-STEPPE LANDSCAPES, INFORMATION ANALYSIS OF IT AND ITS MEANING FOR MONITORING OF FOREST-STEPPE
E. K. Daineko *In its* Geosystem Studies for Monitoring 1981 p 81-89 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

N83-33251# Academy of Sciences (USSR), Moscow.
DAILY AND SEASONAL DYNAMICS OF LEAF CANOPY ORIENTATION IN PHYTOCENOSES
E. A. Denisenko and E. D. Gavrilova *In its* Geosystem Studies for Monitoring 1981 p 107-115 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

N83-33256# Academy of Sciences (USSR), Moscow.
USE OF BIOGEOPHYSICAL OBSERVATION METHODS FOR THE MONITORING OF STATUS AND PRODUCTION OF AGROPHYTOCENOSE
V. V. Kolomeithenko *In its* Geosystem Studies for Monitoring 1981 p 148-155 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

N83-33259# Academy of Sciences (USSR), Moscow.
USING OF ORIENTED GRAPHS OF SIMILARITY FOR MONITORING OF VEGETATION DYNAMICS
P. N. Melancholin *In its* Geosystem Studies for Monitoring 1981 p 167-173 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

N83-33261# Academy of Sciences (USSR), Moscow.
PLANT TERATA AS AN INDICATOR FOR GEOSYSTEM MONITORING WITH SPECIAL REFERENCE TO WESTERN TIAN-SHAN
A. A. Ivastschenko *In its* Geosystem Studies for Monitoring 1981 p 181-195 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N83-33310 Societe Nationale Industrielle Aerospatiale, Les Mureaux (France).
THE ENERGY WHEEL IN OPERATION
J. P. Barthelemy 1982 5 p refs Presented at INTELEC 82, Washington
(SNIAS-831-422-103) Avail: NTIS HC A02

An energy wheel was implemented as an uninterruptible power supply unit for a rural telephone exchange. A high speed rotor, magnetically suspended, inside a vacuum container, is activated by a brushless motor. Being reversible, this motor acts as an electrical energy generator in case of failure or microcuts from the mains. No failure, no maintenance, no detrimental effect of cold winter environment, and satisfactory level of available back up energy are reported. Improvements such as mass reduction, easy implementation, vacuum tightness, and ac supply are identified. Author (ESA)

N83-33311# Virginia Univ., Charlottesville. School of Enginering and Applied Science.
DEVELOPMENT OF THE SCHLADITZ OIL BURNER
Hermann J. Schladitz May 1982 28 p Prepared for Brookhaven National Lab., Upton, N.Y.
(Contract DE-AC02-76-CH-00016)
(BNL-51549) Avail: NTIS HC A03/MF A01

Two conventional residential oil burners were successfully modified using the Schladitz heat exchanger technology so that they burn with a stable, highly efficient flame. One burner operates at a fixed rate of 0.2 gph. The other can be operated at any flow rate from 0.1 to 0.6 gph. Author

N83-33312# Foster-Miller Associates, Inc., Waltham, Mass.
A LOW INPUT, VARIABLE FIRING RATE, OIL-FIRED BURNER Final Report
Charles F. Mariano May 1982 35 p Prepared for Brookhaven National Lab., Upton, N.Y.
(Contract DE-AC02-76CH-00016)
(BNL-51558) Avail: NTIS HC A03/MF A01

A prototype low input, VFR oil burner was developed which vaporizes the fuel and mixes it with air prior to combustion. The resulting flame is sootless, odorless, quiet, and efficient (only 5 to 10% excess air). The turndown range is 6:1 and could be extended to 12:1. At 14.25% CO2, the NOx level is typical for a standard gas burner firing at 12% CO2; this is a slight improvement, considering the higher flame temperature of the prototype burner. Author

N83-33313# Hawaii Natural Energy Inst., Honolulu.
HAWAII NATURAL ENERGY INSTITUTE REPORT ON THREE INNOVATIVE PHOTOVOLTAIC APPLICATIONS FOR RESIDENCES EXPERIMENTS Final Report
D. Richard Neill and George D. Curtis Jun. 1982 61 p Prepared for Lincoln Lab., MIT, Lexington, Mass.
(Contract DE-AC02-76ET-20279)
(DOE/ET-20279/211) Avail: NTIS HC A04/MF A01

A research program to install utility-backed photovoltaic (PV) power systems in three lived-in residences in Hawaii is discussed. Solutions to problems related to PV installation were developed, system performance in real world situations was demonstrated, and penetration of PV to the utilities was analyzed. The PV systems and their installation are described as well as the data collection systems used to monitor performance. The project is evaluated and costs are summarized. S.L.

N83-33314# New Mexico State Univ., Las Cruces. Solar Energy Inst.
ESTABLISHMENT AND OPERATION OF THE SOUTHWEST RESIDENTIAL EXPERIMENT STATION
Aug. 1982 189 p refs Prepared for Lincoln Lab., MIT, Lexington, Mass.
(Contract DE-AC02-76ET-20279)
(DOE/ET-20279/213) Avail: NTIS HC A09/MF A01

The establishment of the Southwest Residential Experiment Station (SW RES) and the construction and initial testing of the eight photovoltaic (PV) Prototype Systems are described. Problems are described, histograms are presented, and an economic analysis of monthly utility bills is presented. Author

N83-33315*# Optical Coating Lab., Inc., City of Industry, Calif. Photoelectronics Div.
SILICON SOLAR CELL PROCESS DEVELOPMENT, FABRICATION AND ANALYSIS
P. A. Iles and D. C. Leung 31 Dec. 1982 93 p refs Sponsored by NASA and DOE Prepared for JPL, Pasadena, Calif.
(Contract JPL-955089)
(NASA-CR-172983; DOE/JPL-955089-81/12; JPL-9950-834; NAS 1.26:172983) Avail: NTIS HC A05/MF A01 CSCL 10A

For UCP Si, randomly selected wafers and wafers cut from two specific ingots were studied. For the randomly selected wafers, a moderate gettering diffusion had little effect. Moreover, an efficiency up to 14% AMI was achieved with advanced processes. For the two specific UCP ingots, ingot #5848-13C displayed severe impurity effects as shown by lower 3sc in the middle of the ingot and low CFF in the top of the ingot. Also the middle portions of this ingot responded to a series of progressively more severe gettering diffusion. Unexplained was the fact that severely gettered samples of this ingot displayed a negative light biased effect on the minority carrier diffusion length while the nongettered or moderately gettered ones had the more conventional positive light biased effect on diffusion length. On the other hand, ingot C-4-21A did not have the problem of ingot 5848-13C and behaved like to the randomly selected wafers. The top half of the ingot was shown to be slightly superior to the bottom half, but moderate gettering helped to narrow the gap. Author

N83-33316*# Cornell Univ., Ithaca, N. Y. Dept. of Materials Science and Engineering.
EBIC INVESTIGATION OF HYDROGENATION OF CRYSTAL DEFECTS IN EFG SOLAR SILICON RIBBONS Quarterly Report, 1 Jan. - 31 Mar. 1983
T. Sullivan and D. G. Ast May 1983 98 p refs Sponsored by NASA and DOE Prepared for JPL, Pasadena, Calif.
(Contract JPL-956046)
(NASA-CR-172975; DOE/JPL-956046-83/5; JPL-9950-844; NAS 1.26:172975) Avail: NTIS HC A05/MF A01 CSCL 10A

Changes in the contrast and resolution of defect structures in 205 Ohm-cm EFG polysilicon ribbon subjected to annealing and hydrogenation treatments were observed in a JEOL 733 Superprobe scanning electron microscope, using electron beam induced current (EBIC) collected at an A1 Schottky barrier. The Schottky barrier was formed by evaporation of A1 onto the cleaned and polished surface of the ribbon material. Measurement of beam energy, beam current, and the current induced in the Schottky diode enabled observations to be quantified. Exposure to hydrogen plasma increased charge collection efficiency. However, no simple causal relationship between the hydrogenation and charge collection efficiency could be inferred, because the collection efficiency also displayed an unexpected thermal dependence. Good quality intermediate-magnification (1000X-5400X) EBIC micrographs of several specific defect structures were obtained. Comparison of grown-in and stress-induced dislocations after annealing in vacuum at 500 C revealed that stress-induced dislocations are hydrogenated to a much greater degree than grown-in dislocations. The theoretical approximations used to

predict EBIC contrast and resolution may not be entirely adequate to describe them under high beam energy and low beam current conditions. Author

N83-33317*# Physical Sciences, Inc., Andover, Mass.
ADVANCED COAL GASIFIER-FUEL CELL POWER PLANT SYSTEMS DESIGN Final Report
Martin E. Heller Jan. 1983 91 p refs
(Contracts NAS7-918; JPL-956332)
(NASA-CR-172986; JPL-9950-789; NAS 1.26:172986; PSI-360) Avail: NTIS HC A05/MF A01 CSCL 10B

Two advanced, high efficiency coal-fired power plants were designed, one utilizing a phosphoric acid fuel cell and one utilizing a molten carbonate fuel cell. Both incorporate a TRW Catalytic Hydrogen Process gasifier and regenerator. Both plants operate without an oxygen plant and without requiring water feed; they, instead, require makeup dolomite. Neither plant requires a shift converter; neither plant has heat exchangers operating above 1250 F. Both plants have attractive efficiencies and costs. While the molten carbonate version has a higher (52%) efficiency than the phosphoric acid version (48%), it also has a higher ($0.078/kWh versus $0.072/kWh) ten-year levelized cost of electricity. The phosphoric acid fuel cell power plant is probably feasible to build in the near term: questions about the TRW process need to be answered experimentally, such as weather it can operate on caking coals, and how effective the catalyzed carbon-dioxide acceptor will be at pilot scale, both in removing carbon dioxide and in removing sulfur from the gasifier. Author

N83-33318*# Spire Corp., Bedford, Mass.
EVALUATION OF THE ION IMPLANTATION PROCESS FOR PRODUCTION OF SOLAR CELLS FROM SILICON SHEET MATERIALS Quarterly Report, 1 Jan. - 1 Apr. 1983
Mark B. Spitzer Apr. 1983 14 p
(Contract JPL-956381)
(NASA-CR-172959; JPL-9950-832; NAS 1.26:172959; CDRL-181; QR-10085-01; QR-1) Avail: NTIS HC A02/MF A01 CSCL 10A

For the ion implantation tooling was fabricated with which to hold dendritic web samples. This tooling permits the expeditious boron implantation of the back to form the back surface field (BSF). Baseline BSF web cells were fabricated. Author

N83-33319*# Kayex Corp., Rochester, N. Y.
CONTINUOUS CZOCHRALSKI GROWTH. DEVELOPMENT OF ADVANCED CZOCHRALSKI GROWTH PROCESS TO PRODUCE LOW COST 150 KG SILICON INGOTS FROM A SINGLE CRUCIBLE FOR TECHNOLOGY READINESS Final Report, Oct. 1980 - Apr. 1982
[1982] 134 p refs
(Contract JPL-955733)
(NASA-CR-172965; DOE/JPL-955733-6; NAS 1.26:172965; DRL-136; DRD-SE-7) Avail: NTIS HC A07/MF A01 CSCL 10A

The improvement of growth rates using radiation shielding and investigation of the crucible melt interaction for improved yields were emphasized. Growth runs were performed from both 15 and 16 inch diameter crucibles, producing 30 and 37 kg ingots respectively. Efforts to increase the growth rate of 150 mm diameter ingots were limited by temperature instabilities believed to be caused by undesirable thermal convections in the larger melts. The radiation shield improved the growth rate somewhat, but the thermal instability was still evident, leading to nonround ingots and loss of dislocation-free structure. A 38 kg crystal was grown to demonstrate the feasibility of producing 150 kg with four growth cycles. After the grower construction phase, the Hamco microprocessor control system was interfaced to the growth facility, including the sensor for automatic control of seeding temperature, and the sensor for automatic shouldering. Efforts focused upon optimization of the seeding, necking, and shoulder growth automation programs. S.L.

N83-33320*# Hughes Aircraft Co., Long Beach, Calif. Support Systems.
MODULAR PHOTOVOLTAIC STAND-ALONE SYSTEMS: PHASE 1 Final Report
George J. Naff and Neil A. Marshall Feb. 1983 298 p
(Contracts DEN3-207; DE-AI01-79ET-20485)
(NASA-CR-168075; DOE/NASA/0207-1; NAS 1.26:168075; HAC-F107-500) Avail: NTIS HC A13/MF A01 CSCL 10A

A family of modular stand-alone power systems that covered the range in power level from 1 kw to 14 kw was developed. Products within this family were required to be easily adaptable to different environments and applications, and were to be both reliable and cost effective. Additionally, true commonality in hardware was to be exploited, and unnecessary recurrence of design and development costs were to be minimized; thus improving hardware availability. Assurance of compatibility with large production runs, was also an underlying program goal. A secondary objective was to compile, evaluate, and determine the economic and technical status of available, and potentially available, technology options associated with the balance of systems (BOS) for stand-along photovoltaic (PV) power systems. The secondary objective not only directly supported the primary but additionally contributed to the definition and implementation of the BOS cost reduction plan. Author

N83-33321*# Toronto Univ. (Ontario).
MODELING OF PHOTODEGRADATION IN SOLAR CELL MODULES OF SUBSTRATE AND SUPERSTRATE DESIGN MADE WITH ETHYLENE-VINYL ACETATE AS POTTANT MATERIAL Annual Report
A. C. Somersall and J. E. Guillet 1981 17 p refs Sponsored by NASA Prepared for JPL, Pasadena, Calif.
(Contract JPL-955591)
(NASA-CR-172981; DOE/JPL-955591-83/6; JPL-9950-830; NAS 1.26:172981) Avail: NTIS HC A02/MF A01 CSCL 10A

The rates of hydrogen abstraction by peroxy radicals were proven to be too slow for significant oxidation of the alkane substrate to be important. The numerical procedure, independent of our particular data base was verified by reproducing concentration time profiles for a model reaction set describing the cesium flare system in the upper atmosphere. Simulation was identical to that given in the literature. Experimental verification of the data base is to be attempted by weatherometry studies in the coming year. Work on the new diagnostic techniques was completed. The adapted automated viscometer was demonstrated to be an efficient and reliable tool for routine measurements of viscosity (molecular weight) changes in solid samples after batch solutions have been made up. The laser photolysis GC method for monitoring extremely low levels of oxidation in polymers proved to be impractical because the yields of carbon monoxide were too low for quantification. Much progress was made with the computer model. The reaction matrix was completely revised, resulting in a new scheme of 31 reactions and time, lifetimes in excess of ten years. The results to date lead us to some tentative observations. Author

N83-33322*# Solarelectronics, Inc., Bellingham, Mass.
INVESTIGATION OF THE HYDROCHLORINATION OF SiCl4 Final Report, 9 Jul. 1981 - 8 Apr. 1983
Jeffrey Y. P. Mui 15 Apr. 1983 207 p refs Sponsored by NASA and DOE Prepared for JPL, Pasadena, Calif.
(Contract JPL-956061)
(NASA-CR-172980; DOE/JPL-956061-7; JPL-9550-847; NAS 1.26:172980) Avail: NTIS HC A10/MF A01 CSCL 10A

The hydrochlorination of silicon tetrachloride with hydrogen and metallurgical grade (m.g.) silicon metal, 3 SiCl4 + 2 H2 + Si yields 4 SiHCl3 was shown to be an efficient process to produce trichlorosilane. A research and development program was carried out to study the hydrochlorination reaction over a wide range of reaction conditions. Equilibrium constant and reaction kinetics measurements were made to provide the basis for a theoretical study on the hydrochlorination process. Thermodynamic properties of the hydrochlorination reaction were also measured. The effects of temperature, pressure, and concentration on the equilibrium constant, K sub p, were studied. Author

N83-33323*# Solarex Corp., Rockville, Md.
PROCESS RESERACH ON POLYCRYSTALLINE SILICON MATERIAL (PROPSM) Quarterly Report, 1 Mar. - 30 Jun. 1982
John H. Wohlgemuth and Jerry S. Culik 1982 20 p Sponsored in part by DOE Prepared for JPL
(Contract JPL-955902)
(NASA-CR-172982; JPL-9950-838; DOE/JPL-955902-82/6; NAS 1.26:172982; DRL-156; DRD-SE-3; QR-6) Avail: NTIS HC A02/MF A01 CSCL 10A

The mechanisms limiting performance in polycrystalline silicon was determined. The initial set of experiments in this task entails the fabrication of cells of various thicknesses for four different bulk resistivities between 0.1 and 10 omega-cm. The results for the first two lots are presented. S.L.

N83-33324*# Westinghouse Electric Corp., Pittsburgh, Pa. Advanced Energy Systems Div.
LOW COST SOLAR ARRAY PROJECT: CELL AND MODULE FORMATION RESEACH AREA. PROCESS RESEARCH OF NON-CZ SILICON MATERIAL Quarterly Report, 1 Mar. - 31 May 1983
31 May 1983 34 p Sponsored by NASA and DOE Prepared for JPL, Pasadena, Calif.
(Contract JPL-955909)
(NASA-CR-172984; DOE/JPL-955909-83/10; JPL-9950-846; NAS 1.26:172984; WAESD-TR-83-1005; QR-5) Avail: NTIS HC A03/MF A01 CSCL 10A

Meniscus coates tests, back junction formation using a new boron containing liquid, tests of various SiO2 and boron containing liquids, pelletized silicon for replenishment during web growth, and ion implantation compatibility/feasibility study are discussed.
Author

N83-33325*# Spectrolab, Inc., Sylmar, Calif.
DESIGN, ANALYSIS AND TEST VERIFICATION OF ADVANCED ENCAPSULATION SYSTEMS Triannual Report, period ending 31 Mar. 1983
Alexander Garcia, III, James M. Kallis, and D. Charles Trucker Jun. 1983 47 p refs Sponsored by NASA and DOE Prepared for JPL, Pasadena, Calif.
(Contract JPL-955567)
(NASA-CR-172985; DOE/JPL-955567-83/11; JPL-9950-845; NAS 1.26:172985) Avail: NTIS HC A03/MF A01 CSCL 10A

Analytical models were developed to perform optical, thermal, electrical and structural analyses on candidate encapsulation systems. From these analyses several candidate encapsulation systems were selected for qualification testing. Author

N83-33326*# Applied Concepts Corp., Woodstock, Va.
AIR FORCE LOGISTICS COMMAND (AFLC) SOLAR THERMAL PLANT Final Report
15 Apr. 1983 65 p Prepared for JPL, Pasadena, Calif.
(Contracts NAS7-100; JPL-956231)
(NASA-CR-172975; JPL-9950-840; NAS 1.26:172975; K10-01-83FR) Avail: NTIS HC A04/MF A01 CSCL 10B

The plant proved its capability to deliver the desired energy product in a USAF industrial environment. The collector proved capable of energy conversion at insolation levels up to 25% below design minimum. The plant and the project were negatively affected by severe winter weather, with total insolation during the test period 60 percent less than the expected value. Environmental effects reduced plant availability to 55 percent. Only five, minimally good operating days were experienced during the test period. The subsequent lack of performance data prohibits the drawing of general conclusions regarding system performance. System operability was rated generally high. The only inhibiting factor was the difficulty in procuring replacement parts for rapid repair under USAF stockage and procurement policies. No inherently serious system failures were recorded, although a thermostatic valve malfunction in the freeze protection system ultimately took 30 days to repair. Author

N83-33327*# Toronto Univ. (Ontario). Dept. of Chemistry.
MODELLING OF POLYMER PHOTODEGRADATION FOR SOLAR CELL MODULES Quarterly Technical Progress Report, 1 Apr. - 30 Jun. 1983
A. C. Somersall and J. E. Guillet 30 Jun. 1983 7 p Sponsored by NASA Prepared for JPL, Pasadena, Calif.
(Contract JPL-955591)
(NASA-CR-172976; DOE/JPL-955591-83/3; JPL-9950-851; NAS 1.26:172976) Avail: NTIS HC A02/MF A01 CSCL 10A

The photooxidation process was modelled with input data consisting of Arrhenius parameters A (the preexponential factor) and E (the activation energy). Author

N83-33328*# Applied Solar Energy Corp., City of Industry, Calif.
MICROCRYSTALLINE SILICON GROWTH FOR HETEROJUNCTION SOLAR CELLS Quarterly Report, 1 Nov. 1982 - 31 Mar. 1983
P. A. Iles, D. C. Leung, and P. H. Fang (Boston Coll.) 31 Mar. 1983 51 p refs Sponsored by NASA and DOE Prepared for JPL, Pasadena, Calif.
(Contract JPL-956369)
(NASA-CR-172979; DOE/JPL-956369-83/01; JPL-9950-848; NAS 1.26:172979; QR-1) Avail: NTIS HC A04/MF A01 CSCL 10A

A total of sixteen runs of e-beam vacuum deposition of p type microcrystalline Si (m-Si) films were attempted on n type or p-n junction single crystalline Si (C-Si) substrates. The m-Si film thickness varied from .15 to .7 um and metal contacts were deposited after plasma hydrogenation. The p-m-Si on n-c-Si structure had a Voc of up to 490 m V while no Voc improvements were observed in the p-m-Si on p-n C-Si structure against p-n controls. Both CFF and Jsc were lower than control. Possible problem areas were interfaced between m-Si and C-si and the back contacts due to lack of sintering for fear of dehydrogenation. Author

N83-33329*# Toronto Univ. (Ontario).
MODELLING OF PHOTODEGRADATION IN SOLAR CELL MODULES OF SUBSTRATE AND SUPERSTRATE DESIGN MADE WITH ETHYLENE-VINYL ACETATE AS POTTANT MATERIAL
A. C. Somersall and J. E. Guillet 1982 26 p refs Sponsored in part by DOE Prepared for JPL
(Contracts NAS7-100; JPL-955591)
(NASA-CR-172978; DOE/JPL-955591-83/7; JPL-9950-852; NAS 1.26:172978) Avail: NTIS HC A03/MF A01 CSCL 10A

A computer model which simulates, in principle, the chemical changes in the photooxidation of hydrocarbons using as input data a set of elementary reactions, corresponding kinetic rate data and appropriate initial conditions was developed. The Model was refined and exploited to examine more closely the photooxidation and photostabilization of a hydrocarbon polymer. The results lead to the following observations. (1) The time to failure, tau sub f (chosen as the level of 5% C-H bond oxidation which is within the range anticipated for marked change in mechanical properties) varies as the inverse square root of the light intensity. However, tau sub f is almost unaffected by both the photoinitiator type and concentration. (2) The time to failure decreases with the rate of abstraction of C-H by peroxy radicals but increases with the rate of bimolecular radical termination controlled by diffusion. (3) Of the various stabilization mechanisms considered, the trapping of peroxy radicals is distinctly the most effective, although the concommitant decomposition of hydroperoxide is also desirable.
S.L.

N83-33330*# Spectrolab, Inc., Sylmar, Calif.
DEVELOPMENT OF METALLIZATION PROCESS: FSA PROJECT, CELL AND MODULE FORMATION RESEARCH AREA Quarterly Technical Progress Report, period ending 31 Mar. 1983
Alexander Garcia, III May 1983 15 p Sponsored by NASA and DOE Prepared for JPL, Pasadena, Calif.
(Contract JPL-956205)
(NASA-CR-172969; DOE/JPL-956205-83/4; JPL-9950-849; NAS 1.26:172969; QTPR-6329-12) Avail: NTIS HC A02/MF A01 CSCL 10A

The use of CO in place of H2 for the reducing step did not appreciably increase solderability of interconnects. Cells were also made printing the pastes on top of ITO coatings. Some of these cells were the best electrically but the metallization was still not adhering. Sequential use of H2 and CO had no effect on adhesion (or lack of it). Author

N83-33331*# Pennsylvania Univ., Philadelphia.
ANALYSIS AND EVALUATION IN THE PRODUCTION PROCESS AND EQUIPMENT AREA OF THE LOW-COST SOLAR ARRAY PROJECT Final Report
M. Wolf 30 Aug. 1982 69 p refs Sponsored by NASA and DOE Prepared for JPL, Pasadena, Calif.
(Contract JPL-956034)
(NASA-CR-172972; DOE/JPL-956034-81/1; JPL-9950-822; NAS 1.26:172972) Avail: NTIS HC A04/MF A01 CSCL 10A

It was found that the Solarex metallization design and process selection should be modified to yield substantially higher output of the 10 cm x 10 cm cells, while the Westinghouse design is extremely close to the optimum. In addition, further attention to the Solarex pn junction and base high/low junction formation processes could be beneficial. For the future efficiency improvement, it was found that refinement of the various minority carrier lifetime measurement methods is needed, as well as considerably increased sophistication in the interpretation of the results of these methods. In addition, it was determined that further experimental investigation of the Auger lifetime is needed, to conclusively determine the Auger coefficients for the direct Auger recombination at high majority carrier concentrations. Author

N83-33332*# Westinghouse Research and Development Center, Pittsburgh, Pa.
LARGE-AREA SHEET TASK ADVANCED DENDRITIC WEB GROWTH DEVELOPMENT Quarterly Report, 23 Oct. - 31 Dec. 1982
C. S. Duncan, R. G. Seidensticker, and J. P. McHugh 22 Mar. 1983 26 p refs Sponsored by NASA and DOE Prepared for JPL, Pasadena, Calif.
(Contract JPL-955843)
(NASA-CR-172971; DOE/JPL-955843-83/9; JPL-9950-823; NAS 1.26:172971) Avail: NTIS HC A03/MF A01 CSCL 10A

The thermal stress models were used to test the effect of melt level on stress generation and growth velocity. The results indicate that melt level has only small effects on stresses but significant effects on growth velocity. These results are consistent with experimental growth from measured melt levels. A new low-stress design concept is being evaluated with the models. A width-limiting version of the low-stress J460 configuration was tested experimentally with results consistent with the design goals. Author

N83-33333*# Pioneer Engineering and Mfg. Co., Inc., Warren, Mich.
COST ANALYSIS OF AN AIR BRAYTON RECEIVER FOR A SOLAR THERMAL ELECTRIC POWER SYSTEM IN SELECTED ANNUAL PRODUCTION VOLUMES Final Report
18 Dec. 1981 76 p Sponsored by NASA Prepared for JPL, Pasadena, Calif.
(Contract JPL-955791)
(NASA-CR-172970; JPL-9950-829; NAS 1.26:172970) Avail: NTIS HC A05/MF A01 CSCL 10B

Pioneer Engineering and Manufacturing Company estimated the cost of manufacturing and Air Brayton Receiver for a Solar Thermal Electric Power System as designed by the AiResearch Division of the Garrett Corporation. Production costs were estimated at annual volumes of 100; 1,000; 5,000; 10,000; 50,000; 100,000 and 1,000,000 units. These costs included direct labor, direct material and manufacturing burden. A make or buy analysis was made of each part of each volume. At high volumes special fabrication concepts were used to reduce operation cycle times. All costs were estimated at an assumed 100% plant capacity. Economic feasibility determined the level of production at which special concepts were to be introduced. Estimated costs were based on the economics of the last half of 1980. Tooling and capital equipment costs were estimated for ach volume. Infrastructure and personnel requirements were also estimated. B.W.

N83-33334*# Rockwell International Corp., Thousand Oaks, Calif. Microelectronics Res. and Development Center.
NONDESTRUCTIVE EVALUATION TECHNIQUES FOR NICKEL-CADMIUM AEROSPACE BATTERY CELLS Final Technical Report
Ron Haak and Dennis Tench Oct. 1982 53 p refs
(Contract NAS7-918; JPL-955708)
(NASA-CR-172964; NAS 1.26:172964) Avail: NTIS HC A04/MF A01 CSCL 10C

The ac impedance characteristics of Ni-Cd cells as an in-situ, nondestructive means of determining cell lifetime, particularly with respect to the probability of premature failure were evaluated. Emphasis was on evaluating Ni-Cd cell impedance over a wide frequency range (10,000 to 0.0004 Hz) as the cells were subjected to charge/discharge cycle testing. The results indicate that cell degradation is reflected in the low frequency (Warburg) impedance characteristics associated with diffusion processes. The Warburg slope (W) was found to steadily increase as a function of cell aging for completely discharged cells. In addition, based on data for two cells, a high or rapidly increasing value for W signals imminent cell failure by one mechanism. Degradation by another mechanism is apparently reflected in a fall-off (roll-over) of W at lower frequencies. As a secondary result, the frequency dependence of the absolute cell impedance at low frequencies (5 - 500 mHz) was found to be a good indication of the cell state-of-charge. S.L.

N83-33335*# Engineering Research West, Santa Monica, Calif. Biocatalysis Research Activity.
ISOTHERMAL SEPARATION PROCESSES
Christopher England Jul. 1982 37 p
(NASA-CR-172961; JPL-9950-813; NAS 1.26:172961) Avail: NTIS HC A03/MF A01 CSCL 10A

The isothermal processes of membrane separation, supercritical extraction and chromatography were examined using availability analysis. The general approach was to derive equations that identified where energy is consumed in these processes and how they compare with conventional separation methods. These separation methods are characterized by pure work inputs, chiefly in the form of a pressure drop which supplies the required energy. Equations were derived for the energy requirement in terms of regular solution theory. This approach is believed to accurately predict the work of separation in terms of the heat of solution and the entropy of mixing. It can form the basis of a convenient calculation method for optimizing membrane and solvent properties for particular applications. Calculations were made on the energy requirements for a membrane process separating air into its components. Author

N83-33336*# Spectrolab, Inc., Sylmar, Calif.
DEVELOPMENT OF METALLIZATION PROCESS Quarterly Technical Progress Report
Alexander Garcia, III Apr. 1983 10 p
(Contract JPL-956205)
(NASA-CR-172958; JPL-9950-824; NAS 1.26:172958; DOE/JPL-956205-83/3; QTPR-6329-9; DRL-175) Avail: NTIS HC A02/MF A01 CSCL 10A

Solar cells were produced using a Mo/Sn/TiH screen printed paste with a lead/borosilicate frit that are electrically comparable to control silver cells. The process is currently unsuccessful because the soldering of interconnects to these cells has proved difficult. Future work will investigate using CO instead of H2 as the reducing gas and putting an ITO coating on the cell prior to metallization. Author

N83-33337*# Toronto Univ. (Ontario). Dept. of Chemistry.
MODELING OF POLYMER PHOTODEGRADATION FOR SOLAR CELL MODULES Quarterly Technical Progress Report, 1 Jan.

- 31 Mar. 1983
A. C. Somersall and J. E. Guillet [1982] 6 p Sponsored by NASA
(NASA-CR-172968; DOE/JPL-955591-83/2; NAS 1.26:172968; DRL-119; DRD-SE-5) Avail: NTIS HC A02/MF A01 CSCL 10A

It was shown that many of the experimental observations in the photooxidation of hydrocarbon polymers can be accounted for with a computer simulation using an elementary mechanistic model with corresponding rate constants for each reaction. For outdoor applications, however, such as in photovoltaics, the variation of temperature must have important effects on the useful lifetimes of such materials. The data bank necessary to replace the isothermal rate constant values with Arrhenius activation parameters: A (the pre-exponential factor) and E (the activation energy) was searched. The best collection of data assembled to data is summarized. Note, however, that the problem is now considerably enlarged since from a theoretical point of view, with 51 of the input variables replaced with 102 parameters. The sensitivity of the overall scheme is such that even after many computer simulations, a successful photooxidation simulation with the expanded variable set was not completed. Many of the species in the complex process undergo a number of competitive pathways, the relative importance of each being often sensitive to small changes in the calculated rate constant values. S.L.

N83-33338*# Solarex Corp., Rockville, Md.
PROCESS RESEARCH ON POLYCRYSTALLINE SILICON MATERIAL (PROPSM) Quarterly Report
J. S. Culik [1982] 48 p refs
(Contract JPL-95590)
(NASA-CR-172963; JPL-9950-842; DOE/JPL-955902-83/9; NAS 1.26:172963; QR-9) Avail: NTIS HC A03/MF A01 CSCL 10A

The investigation of the performance limiting mechanisms in large grain (greater than 1-2 mm in diameter) polycrystalline silicon was continued by fabricating a set of minicell wafers on a selection of 10 cm x 10 cm wafers. A minicell wafer consists of an array of small (approximately 0.2 sq cm in area) photodiodes which are isolated from one another by a mesa structure. The junction capacitance of each minicell was used to obtain the dopant concentration, and therefore the resistivity, as a function of position across each wafer. The results indicate that there is no significant variation in resistivity with position for any of the polycrystalline wafers, whether Semix or Wacker. However, the resistivity of Semix brick 71-01E did decrease slightly from bottom to top. Author

N83-33339*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
HANDBOOK OF PHOTOTHERMAL TEST DATA ON ENCAPSULANT MATERIALS
R. H. Liang, K. L. Oda, S. Y. Chung, M. V. Smith, and A. Gupta 1 May 1983 159 p refs Sponsored in part by NASA
(Contract DE-AI01-76ET-20356)
(NASA-CR-172989; DOE/JPL-1012/86; JPL-Pub-83-32; NAS 1.26:172989) Avail: NTIS HC A08/MF A01 CSCL 10A

Laboratory tests performed to characterize candidate encapsulation materials with respect to changes in their physical and chemical properties caused by photothermal aging are described. Several key material properties relating directly to material degradation and deterioration of performance were identified and were monitored as functions of aging conditions and time. A status report on accelerated testing activities is provided and experimental data are presented. It will be updated periodically as more data become available. Author

N83-33340*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
CALIFORNIA METHANOL ASSESSMENT. VOLUME 1: SUMMARY REPORT
R. OToole, E. Dutzi, R. Gershman, R. Heft, W. Kalema, and D. Maynard Mar. 1983 151 p refs Sponsored by NASA Prepared in cooperation with California Inst. of Tech., Pasadena 2 Vol.
(NASA-CR-172990; JPL-5030-562-Vol-1; JPL-Pub-83-18-Vol-1; NAS 1.26:172990) Avail: NTIS HC A08/MF A01 CSCL 10A

The near term methanol industry, the competitive environment, long term methanol market, the transition period, air quality impacts of methanol, roles of the public and private sectors are considered. N.W.

N83-33341*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
CALIFORNIA METHANOL ASSESSMENT. VOLUME 2: TECHNICAL REPORT
R. OToole, E. Dutzi, R. Gershman, R. Heft, W. Kalema, and D. Maynard Mar. 1983 646 p refs Sponsored by NASA Prepared in cooperation with California Inst. of Tech., Pasadena 2 Vol.
(NASA-CR-172991; JPL-5030-562-Vol-2; JPL-Pub-83-18-Vol-2; NAS 1.26:172991) Avail: NTIS HC A99/MF A01 CSCL 10A

Energy feedstock sources for methanol; methanol and other synfuels; transport, storage, and distribution; air quality impact of methanol use in vehicles, chemical methanol production and use; methanol utilization in vehicles; methanol utilization in stationary applications; and environmental and regulatory constraints are discussed. Author

N83-33342*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PROCEEDINGS OF THE 21ST PROJECT INTEGRATION MEETING Progress Report, Apr. 1982 - Jan. 1983
Jan. 1983 511 p Meeting held at Pasadena, Calif., 12-13 Jan. 1983
(Contracts NAS7-918; DE-AI01-76ET-20356)
(NASA-CR-172994; DOE/JPL-1012/88; JPL-Pub-83-48; JPL-5101-222; NAS 1.26:172994; PR-21) Avail: NTIS HC A22/MF A01 CSCL 10A

Progress made by the Flat Plate Solar Array Project during the period April 1982 to January 1983 is described. Reports on polysilicon refining, thin film solar cell and module technology development, central station electric utility activities, silicon sheet growth and characteristics, advanced photovoltaic materials, cell and processes research, module technology, environmental isolation, engineering sciences, module performance and failure analysis and project analysis and integration are included. Author

N83-33343*# Boeing Engineering and Construction Co., Seattle, Wash.
MOD-2 WIND TURBINE SYSTEM DEVELOPMENT. VOLUME 2: DETAILED REPORT Final Report
Sep. 1982 194 p refs
(Contracts DEN3-2; DE-AI01-82ET-20305)
(NASA-CR-168007; DOE/NASA/0002-2; NAS 1.26:168007) Avail: NTIS HC A09/MF A01 CSCL 10A

Progress in the design, fabrication, and testing of a wind turbine system is reported. The development of the MOD-2 wind turbine through acceptance testing and initial operational evaluation is documented. The MOD-2 project intends to develop early commercialization of wind energy. The first wind turbine farm (three MOD-2 units) are now being operated at the Bonneville Power Administration site near Goldendale, Washington. E.A.K.

N83-33344# Oak Ridge Associated Universities, Tenn. Manpower Education, Research and Training Div.
ASSESSMENT OF BENEFIT-COST ANALYSIS FOR COAL-EXTRACTION R AND D
Joe G. Baker, Wayne Stevenson, and Stephen E. Reynolds Oct. 1982 38 p refs
(Contract DE-AC05-76OR-00033)
(DE83-004749; ORAU-207) Avail: NTIS HC A03/MF A01

This report has two purposes: (1) to discuss guidelines for applying traditional benefit-cost analysis to coal extraction R and D based on a literature review; and (2) to present a critique of Benefit-Cost Analysis of the Coal Extraction R and D Program, a study by the Mitre Corporation completed in 1976. The guidelines include the strengths, weaknesses, omissions, and limitations of benefit-cost methods as a means to rank coal extraction R and D, including those characteristics that are common to all benefit-cost studies and those that are uniquely related to coal extraction

R and D. Suggestions are made for solutions to problems and limitations of the traditional benefit-cost method, and the usefulness of benefit-cost methods as a means of ranking competing coal R and D programs is assessed. DOE

N83-33345# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
SIMPLE ENERGY-CALCULATION METHOD FOR SOLAR INDUSTRIAL-PROCESS-HEAT STEAM SYSTEMS
Randy Gee Jan. 1983 11 p refs Presented at the 6th Ann. ASME Tech. Conf. on Commercial Bldg. Heating and Cooling Appl., Orlando, Fla., 19 Apr. 1983
(Contract DE-AC02-77CH-00178)
(DE83-007214; SERI/TP-253-1871; CONF-830405-16) Avail: NTIS HC A02/MF A01

Designing a solar industrial process heat (IPH) system, sizing its components and predicting its annual energy delivery requires a method for calculating solar system performance. A calculation method that is accurate, easy to use, accounts for the impact of all important system parameters, and does not require use of a computer is described. Only simple graphs and a hand calculator are required to predict annual collector field performance and annual system losses. The energy calculation method is applicable to a variety of solar system configurations. The calculation method applied only to parabolic trough steam generation systems that do not employ thermal storage is described. Both flash tank and unfired boiler steam systems are covered. DOE

N83-33346# Battelle Columbus Labs., Ohio.
USER'S GUIDE TO SOLREL: A SIMULATION OF RELIABILITY AND AVAILABILITY OF PHOTOVOLTAIC SYSTEMS
Lawrence H. Stember and William R. Huss Jan. 1983 105 p refs Prepared in cooperation with Sandia Labs., Albuquerque, N. Mex.
(Contract DE-AC04-76DP-00789)
(DE83-007581; SAND-82-7152) Avail: NTIS HC A06/MF A01

The SOLREL is a computer based simulation for analyzing the reliability and availability of PV systems. It provides a tool to model their functional behavior and the effects of component and system reliability. It predicts annual maintenance costs and the annual production of power for photovoltaic power systems. The effects are measured by the resulting change in life cycle costs or life cycle energy costs. The Guide's contents are as follows: It summarizes problems SOLREL can address and provides a description of the potential impact and use of the model; overviews the modeling approach, including how it incorporates degradation, failures and repairs; sample outputs from SOLREL are included; results of the application of SOLREL to a commercial concentrator and a residential flat panel PV system are presented; the use of SOLREL in sensitivity analysesl is discussed; several approaches to testing various design alternatives are given; format information to guide the preparation of input data and a comprehensive, annotated listing of the SOLREL software for a flat panel system are included. DOE

N83-33347# Solarex Corp., Rockville, Md.
DESIGN AND FABRICATION OF A PROTOTYPE SYSTEM FOR A PHOTOVOLTAIC RESIDENCE IN THE SOUTHWEST Final Report
Roy Gibson (Mueller Assoc.) Nov. 1982 95 p refs Sponsored in part by New Mexico Solar Energy Inst. and MIT
(Contract DE-AC02-76ET-20279)
(DE83-008128; DOE/ET-20279/235) Avail: NTIS HC A05/MF A01

The design of an energy efficient, photovoltaic, single family residence suitable for construction in the Southwest and the fabricating and testing of a prototype system based on that residence design is discussed. The Prototype contains the power conditioning unit, test equipment, and load simulation equipment. The standoff photovoltaic array, consisting of 78 Sclarex Powerline series modules, produces 5 kilowatts peak. The photovoltaic system is connected to the utility. DOE

N83-33348# Cornell Univ., Ithaca, N. Y. Dept. of Entomology.
ENERGETIC AND ENVIRONMENTAL ASPECTS OF UTILIZING CROP AND FOREST RESIDUES FOR BIOMASS ENERGY Final Report
David Pimentel, Sarah Fast, David Gallahan, and Mary Ann Moran Feb. 1983 119 p refs
(Contract DE-AC02-81ER-60002)
(DE83-008178; DOE/ER-60002/1) Avail: NTIS HC A06/MF A01

Crop and forest residues which are essential to protect the soil from erosion and rapid water runoff and to maintain soil organic matter and nutrients are discussed. Only an estimated 20% of the total residues remaining after harvest can be utilized for fuel conversion because of environmental limitations and the impracticality of harvesting residues on some lands. The residues available for biomass energy could produce a maximum amount of gross energy equal to either 232 million barrels of high grade liquid fuel, 5% of the electrical energy, or 1.5% of total US energy if residues were used as heat. The net yields of energy from the residues, however, would range from only 10 to 50% of the gross because of the large energy inputs for harvesting, hauling, nutrient replacement, and processing. Although these potential contributions to US energy needs are relatively small, it is renewable energy and therefore has some long term value to the nation's energy program. DOE

N83-33349# Electric Power Research Inst., Palo Alto, Calif. Advanced Power Systems Div.
ELECTRIC-UTILITY SOLAR-ENERGY ACTIVITIES: 1982 SURVEY UPDATE
Jennie R. Spelman Dec. 1982 118 p
(DE83-901447; EPRI-AP-2850-SR) Avail: NTIS HC A06/MF A01

The scope of electric utility participation in solar energy projects in the United States was determined. The projects for 1982 are described and significant changes from 1981 in ongoing projects are summarized. A total of 930 projects were reported by 235 utility companies. An index of projects by category, a statistical summary, a list of participating utilities with information contacts and addresses, a list of utilities organized by state, and a list of new reports on utility sponsored projects are included. DOE

N83-33350# Oak Ridge National Lab., Tenn. Energy Div.
USE OF AN OVERALL HEAT-TRANSFER COEFFICIENT TO CALCULATE PERFORMANCE OF AN EVAPORATIVE COOLER
Horacio Perez-Blanco and R. L. Linkous Feb. 1983 36 p refs
(Contract W-7405-eng-26)
(DE83-006371; ORNL/TM-8250) Avail: NTIS HC A03/MF A01

In evaporatively cooled equipment, heat and mass transfer occur simultaneously. This combined process may be characterized by defining an overall heat transfer coefficient, using as the driving force the mean logarithmic difference between the air enthalpy and the fictitious air enthalpy corresponding to the refrigerant or hot fluid temperature. In this work, this method is applied to a vertical tube evaporative cooler and provides a set of simple mathematical equations for determining evaporative cooler performance. The range of applicability of this technique is defined, and theoretical calculations and experimental determinations of the heat transfer coefficient and of the heat load are presented. DOE

N83-33351# Aerospace Systems, Inc., Burlington, Mass.
HORIZONTAL-AXIS WIND-SYSTEM ROTOR PERFORMANCE MODEL COMPARISON: A COMPENDIUM
Feb. 1983 513 p refs Prepared in cooperation with AeroVironment, Inc. and Oregon State Univ. and United Technologies Research Center
(Contract DE-AC04-76DP-03533)
(DE83-012265; RFP-3508) Avail: NTIS HC A22/MF A01

A compendium of four reports, the purpose of which is to evaluate performance prediction methods for horizontal-axis wind turbines is given. A blade-element/momentum analysis and a lifting line/prescribed wake analysis were used. Contractors were to apply their prediction methods to two rotors, that of the Enertech 1500 and that of the 1/3-scale United Technologies Research Center (UTRC) 8 kW turbines. Results from the four prediction

methods are compared with actual test data gathered via Controlled Velocity Testing (CVT). The conclusions are reviewed. For the Enertech 1500, rotor performance predictions closely agreed with CVT data. Yet, because of the lack of high tip speed ratio data, verification of the Glauert momentum theory was not possible. Predictions regarding the UTRC 1/3 scale 8 kW rotor did not agree well with test results. The reasons cited for the discrepancies center on inadequate airfoil section data and the varying blade pitch angles of the unique UTRC flexbeam rotor. DOE

N83-33352# Deutsche Shell A.G., Hamburg (West Germany). Aktuelle Wirtschaftsanalysen.
FUELS FOR THE MARKETS OF TOMORROW [KRAFTSTOFFE FUER DEN MARKT VON MORGEN]
Dec. 1982 25 p In GERMAN
Avail: NTIS HC A02/MF A01

The possibilities and limitations of gasoline, diesel fuels, and alternative fuels for motor vehicles are reviewed. Author (ESA)

N83-33353# Kraftwerk Union A.G. Reaktortechnik, Erlangen (West Germany). Hauptbereich Vertrieb.
DEVELOPMENT OF WEAR RESISTANT GAS TURBINES DOWNSTREAM OF A PRESSURIZED FLUIDIZED BED COMBUSTOR Final Report, Feb. 1982
Bert Rukes Bonn Bundesministerium fuer Forschung und Technologie Apr. 1983 162 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-045; ISSN-0340-7608) Avail: NTIS HC A08/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 32,60

The development of a wear resistant gas turbine, suitable for use in the aggressive gas atmosphere downstream of a pressurized fluidized bed combustor, is studied. The parameters which influence the wear characteristics of gas turbine blades in strongly erosive and corrosive gas atmospheres were investigated. Results show that it is possible, with a corresponding hot gas cleanup system, to construct a wear resistant gas turbine. A test program which includes heating tests, wear-test, and blade cooling tests is outlined. A design for a wear-test facility which permits the study of the combined erosion/corrosion attack on a rotating specimen-carrying disk is suggested. Author (ESA)

N83-33354# Technische Universitaet, Munich (West Germany). Inst. fuer Thermische Kraftanlagen.
DIRECT CONDENSATION WITH HUMID AIR FOR HEAT EVACUATION FROM THERMAL POWER UNITS Final Report, Sep. 1981 [DIREKT-KONDENSATION MIT FEUCHTLUFT ZUR ABWAERMEABLEITUNG AUS THERMISCHEN KRAFTANLAGEN]
Stefan Schwab and Bruno Schiebelsberger Bonn Bundesministerium fuer Forschung und Technologie Apr. 1983 78 p refs In GERMAN Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-054; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 16,50

The technical, economic, and ecological importance of direct condensation with humid air were investigated. Reference tests were conducted on existing units. A coding pipe bundle with two sections was fabricated and mounted. A demonstration model for mass transfer was built. Performance data experimentally obtained for a variation of essential system parameters are evaluated. Theoretical, technical, and economic construction data for hybrid (direct condensation-dry cooling) systems are discussed. Author (ESA)

N83-33355# MITEC G.m.b.H., Ottobrunn (West Germany).
LARGE-SCALE THERMAL STORAGE SYSTEMS. POSSIBILITIES OF OPERATION AND STATE OF THE ART Final Report, Dec. 1981
Reinhard Jank Bonn Bundesministerium fuer Forschung und Technologie May 1983 53 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-074; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 11

The state of the art of large scale thermal energy storage concepts is reviewed. With earth pit storage, the materials question has to be concentrated on. The use of container storage in conventional long distance thermal nets has to be stimulated. Aquifer storage should be tested in a pilot plant to obtain experience in natural aquifer use. Author (ESA)

N83-33356# Technische Universitaet, Munich (West Germany). Bayerische Landesanstalt fuer Landtechnik.
DEVELOPMENT, TESTING AND APPLICATION OF SIMPLE SOLAR AIR HEATERS FOR AGRICULTURE AND INDUSTRY Final Report, Mar. 1982
Klaus Meuren, Manfred Reuss, Stefan Vogt, and Heinz Schulz Bonn Bundesministerium fuer Forschung und Technologie May 1983 124 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-078; ISSN-0340-7608) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 26

The thermal efficiency and other technical and economic data of solar air heaters for drying agricultural products was determined. A plant was built for parallel testing of 10 collectors. The efficiency curve, evaluated from data of bright and sunny days, shows the efficiency versus the reduced parameter and is valid under steady state or quasi-steady state conditions. For a period of 3 months in summer, the total amount of heat collected by the solar air heaters and the drying capacity of the warm air are evaluated. The pressure drop over the collectors and the degradation of the optical properties of the plastic covers are measured. Author (ESA)

N83-33357# Centro Informazioni Studi Esperienze, Milan (Italy). Documentation Service.
ENERGY SAVING IN INDUSTRY: ITALIAN METHODS AND EXPERIENCE [RISPARMIO ENERGETICO NELL'INDUSTRIA. METODOLOGIE ED ESPERIENZE CISE]
F. Dallavalle and C. DeNard 1983 22 p In ITALIAN Presented at Conv. l'Imprenditoria Cooperative per l'Industrializzazione del Risparmio Energetico, Reggio Emilia, Italy, 16-17 Dec. 1982
(CISE-2020) Avail: NTIS HC A02/MF A01

The usefulness and characteristics of the energy audits practiced by a research and technology transfer center (CISE) in industry are described. Italian public financial incentives to energy saving are discussed. The qualification of CISE in energy auditing is commented on. Author (ESA)

N83-33358# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France).
SOPHOCLE 2000 IN MALI [SOPHOCLE 2000 AU MALI]
Francis Legrand 1982 15 p refs In FRENCH Presented at Colloq. sur l'Energie Solaire, Trieste, Italy, Sep. 1982
(SNIAS-831-422-116) Avail: NTIS HC A02/MF A01

It is argued that technical improvements capable of making the kilowatt hour of photovoltaic power economically feasible are only possible using concentration, rather than flat collector technology. The SOPHOCLE 2000 generator, with 2 kw output, for 28 sqm captor area, using Fresnel lenses, is described. The SOPHOCLE was tested in an intertropical site, subject to high humidity, large temperature variations, dust and sandstorms, and a cloudy sky. Improvements to the system are suggested. Author (ESA)

N83-33359# Arizona Univ., Tucson. Engineering Experiment Station.
FEASIBILITY OF WIND TURBINE DIESEL HYBRID GENERATORS AT MCMURDO STATION, ANTARCTICA Final Report
Lawrence B. Scott, Jr., Walter Wrigglesworth, James L. Blair, and Robert Watters Mar. 1983 354 p refs Sponsored in part by the NSF

(Grant NSF DPD-81-08420)
(PB83-189860;) Avail: NTIS HC A16/MF A01 CSCL 10B

The results of a study to determine the feasibility of a wind-turbine/diesel hybrid system for the generation of electricity at McMurdo Station, Antarctica are given. A short description of past and present energy systems at McMurdo is given and some projected energy systems within which wind turbine generators would function are described. Feasibility is then discussed in terms of certain variables and performance parameters characterizing diesel-electric and wind turbine generator systems, and constraints defining the successful operation of these systems at McMurdo Station. GRA

N83-33659# Tokyo Denki Univ. (Japan).
AMORPHOUS SILICON SOLAR CELLS
K. Ebara, K. Homma, T. Fukami, Y. Kobayashi, Y. Abe, and T. Aono *In its* Res. Repts. of the Fac. of Eng., Tokyo Denki Univ., No. 30 Dec. 1982 p 23-40 refs In JAPANESE; ENGLISH summary (For primary document see N83-33656 21-70)
Avail: NTIS HC A08/MF A01

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N83-33360 Prins Maurits Lab. TNO, Rijswijk (Netherlands).
THE OCCURRENCE OF PCH-3-CONTAINING COMPOUNDS IN SURFACE WATERS: AN INTERLABORATORY EXPERIMENT
A. Verweij, G. F. Mensingh, and H. L. Boter Nov. 1982 17 p refs
(Contract A77/K/089)
(PML-1982-58; TDCK-77639) Copyright. Avail: Issuing Activity

The concentration of PCH3-containing compounds was determined in several surface water samples obtained from countries in western Europe and North America. A correlation is found between this concentration and the degree of water pollution, which suggests that the presence of PCH3-containing compounds can be ascribed to industrial sources. The consequences of the presence of the PCH3-background on the applicability of a verification procedure for nerve gases in surface waters are discussed. Author (ESA)

N83-33361# Michigan State Univ., East Lansing.
ENVIRONMENTAL AND SOCIETAL CONSEQUENCES OF A POSSIBLE CO2-INDUCED CLIMATE CHANGE. VOLUME 2, PART 9: ALLEVIATION OF ENVIRONMENTAL STRESS ON RENEWABLE RESOURCE PRODUCTIVITY
Gordon S. Howell Sep. 1982 40 p refs 2 Vol.
(Contract DE-AS01-79EV-10019)
(DOE/EV-10019/9-Vol-2) Avail: NTIS HC A03/MF A01

Temperature and water are the least predictable of the major climatic variables, therefore these two environmental factors are emphasized in a program aimed at ameliorating climatic stresses resultant from increased CO2 levels in the atmosphere. Justifications are given for research on breeding for adaptation to temperature and water stress, crop and environment management to reduce the impact of water and temperatue stresses and physiology, biochemistry, biophysics, and genetics of adaptation to temperature and water stresses. S.L.

N83-33362# Cranfield Inst. of Tech., Bedfordshire (England). Coll. of Aeronautics.
A RAPID METHOD OF CALCULATING THE DOWNWIND DISTRIBUTION FROM AERIAL ATOMIZERS
J. J. Spillman Aug. 1982 18 p refs
(CAR-8224; ISBN-0-902937-77-4) Avail: NTIS HC A02/MF A01

A method of estimating downwind spray deposits using a simple programmable calculatcr was derived. Author

N83-33363# California Univ., Berkeley. Lawrence Berkeley Lab. Energy and Environment Div.
ATMOSPHERIC AEROSOL RESEARCH, CHAPTER 4 Annual Report, FY 1981
Sep. 1982 25 p refs
(Contract DE-AC03-76SF-00098)
(DE83-004954; LBL-13500-Ch-4) Avail: NTIS HC A02/MF A01

Aerosol characterization, formation, transformation, and the effects of aerosols on precipitation, visibility, and climate are presented. Specification of aerosol particles leads to an understanding of their sources and formation pathways. Analytical methods were developed for this characterization. For individual titles, see N83-33364 through N83-33371.

N83-33364# California Univ., Berkeley. Lawrence Berkeley Lab.
SO SUB 2 OXIDATION OF SOOT PARTICLES EXPOSED TO WATER
W. H. Benner, E. Ljungstrom, and T. Novakov *In* LBL Atmospheric Aerosol Res., Chapter 4 Sep. 1982 3 p refs Sponsored in part by EPA (For primary document see N83-33363 21-45)
(Contract DE-AC03-76SF-00098)
Avail: NTIS HC A02/MF A01

The oxidation of SO2 in the atmosphere leads to the formation of sulfuric acid, which, if incorporated into cloud and rain water and not neuralized by ammonia, can acidify the water. The oxidation of SO2 can produce gas to particle transformations and can lead to haze formation. In the ambient atmosphere, SO2 is oxidized by a variety of homogeneous and heterogeneous chemical reactions. Several heterogeneous (i.e., gas-droplet/particle) reaction pathways are stressed. Author

N83-33365# California Univ., Berkeley. Lawrence Berkeley Lab.
AQUEOUS REACTIONS OF NITRITE WITH BISULFITE IONS IN SULFATE AEROSOL FORMATION
S. B. Oblath, S. G. Chang, S. S. Markowitz, and T. Novakov *In* LBL Atmospheric Aerosol Res., Chapter 4 Sep. 1982 2 p refs (For primary document see N83-33363 21-45)
(Contract DE-AC03-76SF-00098)
Avail: NTIS HC A02/MF A01

The role of the oxides of nitrogen (NOx) in the production of atmospheric sulfate aerosols is of concern to environmental chemists both in homogeneous and heterogeneous systems. In aerosol droplets, the NOx reactively dissolve to form mixtures of nitrite and nitrate ions, which can then undergo a number of ionic reactions with aqueous SO2. An understanding of these reactions is important to a complete evaluation of the process of sulfate aerosol formation. Author

N83-33366# California Univ., Berkeley. Lawrence Berkeley Lab.
CARBON PARTICLES IN THE ARTIC
H. J. Rosen and T. Novakov *In* LBL Atmospheric Aerosol Res., Chapter 4 Sep. 1982 3 p refs (For primary document see N83-33363 21-45)
(Contract DE-AC03-76SF-00098)
Avail: NTIS HC A02/MF A01

Recent studies in the Arctic show the presence of unexpectedly high aerosol concentrations, which appear to have a large anthropogenic component. To investigate the chemical composition, origins, and climatic impact of the aerosol, A collaborative sampling program was started. The analyses of the carbonaceous aerosol and its optical properties were emphasized, but it also has the capability to determine other major aerosol components. Preliminary results show that large concentrations of combustion generated particles are present in the Arctic and that they may have a significant impact on the heat balance over this region. Author

N83-33367# California Univ., Berkeley. Lawrence Berkeley Lab.
APPLICATION OF THERMAL ANALYSIS AND PHOTOELECTRON SPECTROSCOPY FOR THE CHARACTERIZATION OF PARTICULATE MATTER
R. L. Dod and T. Novakov *In* LBL Atmospheric Aerosol Res., Chapter 4 Sep. 1982 3 p refs Sponsored in part by NSF (For primary document see N83-33363 21-45)
(Contract DE-AC03-76SF-00098)

Avail: NTIS HC A02/MF A01

Carbon, nitrogen and sulfur containing species account for most of the mass of aerosol particles. Despite years of effort the exact chemical forms of carbon, sulfur, and nitrogen in these particles are not known nor are the formation mechanisms of these species known with certainty. There are many reasons for this situation, including the complexity of the system and the dependence of the apparent chemical composition on the analytical methods used. Because of these possible problems, it seemed desirable to employ a technique that will analyze the bulk properties of particles without chemical treatment or preseparation of the sample and to compare these results with photoelectron spectroscopy (ESCA) results. Thermal analysis in the evolved gas analysis (EGA) mode is one such technique. Author

N83-33368# California Univ., Berkeley. Lawrence Berkeley Lab.
THEORETICAL STUDIES OF THE THERMAL DECOMPOSITION OF CARBONACEOUS AEROSOL PARTICULATES
A. D. A. Hansen and T. Novakov *In* LBL Atmospheric Aerosol Res., Chapter 4 Sep. 1982 3 p refs Sponsored in part by NSF (For primary document see N83-33363 21-45)
(Contract DE-AC03-76SF-00098)
Avail: NTIS HC A02/MF A01

The carbonaceous fraction of atmospheric aerosol particles is a complex mixture of many forms and compounds of carbon, including volatile organics, high molecular weight organics, quasi-'graphitic' microcrystallites, and inorganic carbonates. The development of anaytical methods to separate these components is essential to an understanding of their origins and thus, ultimately, to the development of effective air pollution controls. One analytical method is evolved gas analysis (EGA), which classifies the components according to their decomposition characteristics. A theoretical approach to the interpretation of EGA of the graphitic carbon component of aerosol particles is presented. Author

N83-33369# California Univ., Berkeley. Lawrence Berkeley Lab.
APPLICATION OF SELECTIVE SOLVENT EXTRACTION TO CARBONACEOUS AEROSOLS
L. A. Gundel and T. Novakov *In* LBL Atmospheric Aerosol Res., Chapter 4 Sep. 1982 4 p refs Sponsored in part by NSF (For primary document see N83-33363 21-45)
(Contract DE-AC03-76SF-00098)
Avail: NTIS HC A02/MF A01

Considerable effort was directed toward demonstrating that many polar organic compounds in ambient particulate matter result from photochemical reactions which involve gas phase hydrocarbons and ozone. These aerosol components are secondary organics since their origin is gas to particle conversion rather than direct emission in that particulate phase from sources. Directly emitted particles contain 'primary' organic compounds and elemental or 'black' carbon. Knowledge of the elative contributions of primary and secondary carbon to the aerosol burden will influence the choice of control strategies for particulate matter; and, therefore, development of accurate characterization and quantitation techniques is important. Author

N83-33370# California Univ., Berkeley. Lawrence Berkeley Lab.
THE RELATION BETWEEN CONCENTRATION OF POLYNUCLEAR AROMATIC HYDROCARBONS AND BLACK CARBON
L. A. Gundel, H. J. Rosen, and T. Novakov *In* LBL Atmospheric Aerosol Res., Chapter 4 Sep. 1982 2 p refs Sponsored in part by NSF (For primary document see N83-33363 21-45)
(Contract DE-AC03-76SF-00098)
Avail: NTIS HC A02/MF A01

In addition to black carbon, particulate organic carbon in ambient aerosols contains primary and secondary organic compounds. The relationship between black carbon concentration and one class of primary organic compounds, polynuclear aromatic hydrocarbons (PAH), in urban carbonaceous particles are studied. These compounds and their oxidized derivatives may constitute part of the health hazards associated with ambient and source aerosols. A linear relationship exists between concentrations of several polynuclear aromatic hydrocarbons and black carbon for ambient aerosol particles collected in Berkeley during the summer of 1980. That relationship for particles collected in three other sampling locations in the United States during the same season is investigated. Author

N83-33371# California Univ., Berkeley. Lawrence Berkeley Lab.
DETERMINATION OF LOW-Z ELEMENTS SIMULTANEOUSLY BY CHARGED PARTICLE ACTIVATION ANALYSIS
M. McKinney, S. S. Markowitz, and T. Novakov *In* LBL Atmospheric Aerosol Res., Chapter 4 Sep. 1982 2 p refs Sponsored in part by NSF (For primary document see N83-33363 21-45)
(Contract DE-AC03-76SF-00098)
Avail: NTIS HC A02/MF A01

Rapid nondestructive tecniques for determining carbon, nitrogen, and oxygen in atmospheric aerosols were developed. X ray fluorescence or neutron activation analysis is then used to determine nearly all the higher z elements. Combustion analysis could be used, but they are not sensitive enough for certain applications and the sample would be destroyed. Nondestructive technique were developed. These methods, however require lengthy use of accelerator or reactor time, and requires large samples. A method for simultaneously determining carbon, nitrogen and oxygen in atmospheric aerosols by irradiation of the sample with one type of charged particle was developed. Author

N83-33372# Pacific Northwest Lab., Richland, Wash.
ENVIRONMENTAL EFFECTS OF A REGIONWIDE WEATHERIZATION PROGRAM
W. F. Sandusky and R. A. Craig Oct. 1982 10 p refs Presented at the APCA PNWIS Ann. General Meeting, Vancouver, 15-17 Nov. 1982
(Contract DE-AC06-76RL-01830)
(DE83-003463; PNL-SA-10630; CONF-821131-2) Avail: NTIS HC A02/MF A01

The potential effect on human health resulting from elevated indoor pollutant concentration levels due to installation of house tightening measures is discussed. The techniques used to relate predicted indoor pollution concentration levels to effects on human health are described. The results presented are based on limited regionwide statistics on residences with various indoor pollutant sources. For those pollutants for which a risk factor has yet to be developed, qualitative estimates of effects on human health were made. DOE

N83-33373# Pacific Northwest Lab., Richland, Wash.
TOWARDS THE USE OF FAUNAL POPULATIONS AS COST-EFFECTIVE BIOMONITORS
John R. Skalski Nov. 1982 55 p refs Presented at the Symp. on Issues and Technol. in the Management of Impacted Western Wildlife, Steamboat Springs, Colo., 15-17 Nov. 1982 Sponsored in part by EPA and Geological Survey
(Contract DE-AC06-76RL-01830)
(DE83-005550; PNL-SA-10410; CONF-821158-1) Avail: NTIS HC A04/MF A01

To evaluate the economic feasibility of faunal monitoring the levels of field effort required to detect impacts of reasonable size must be determined. Monitoring efforts are expressed in terms of the numbers of replicate study plots needed for an impact assessment and the levels of sampling effort required to precisely census faunal abundance at each plot. By the use of preliminary sampling data and state of the art quantitative methodology, objective criteria can be used to evaluate the utility of current monitoring practices and to consider the cost benefits of monitoring other components of the terrestrial environment. Estimates of the variance components associated with the sampling of small mammal populations in shrub steppe communities of Colorado and Washington are presented. A cost function is illustrated which can be used in conjunction with variance estimates to determine optimal levels of field replication and sampling effort. DOE

N83-33374# Los Alamos Scientific Lab., N. Mex.
QUALITY ASSURANCE FOR ENVIRONMENTAL ANALYTICAL CHEMISTRY AT LOS ALAMOS

Ernest S. Gladney, Daniel R. Perrin, and William E. Goode 1982 13 p refs Presented at the 4th DOE Environ. Protection Inform. Meeting, Denver, Dec. 1982
(Contract W-7405-eng-36)
(DE83-004729; LA-UR-82-3489; CONF-821215-4) Avail: NTIS HC A02/MF A01

The basic structure philosophy of the program as it has evolved over the past five years is discussed with particular emphasis on traceability and use of certified reference materials. Typical summary results of the program and interactive computerized quality assurance system are presented. DOE

N83-33375# Brookhaven National Lab., Upton, N. Y. National Center for Analysis of Energy Systems.
COMPARING THE HEALTH AND ENVIRONMENTAL HAZARDS OF DIFFERENT ENERGY SYSTEMS
L. D. Hamilton 1982 58 p refs Presented at the Intern. Conf. on Nucl. Power Experience, Vienna, 13-17 Sep. 1982
(Contract DE-AC02-76CH-00016)
(DE83-004591; BNL-32275; CONF-820914-5) Avail: NTIS HC A04/MF A01

Assessing health impacts of different energy sources is discussed. Risk assessment methods are reviewed. Coal and nuclear fuel cycles are compared in respect to morbidity and mortality. Other cycles (oil, gas and renewables) are also examined. In broadening comparisons to include new technologies, one must include the impact of manufacturing the energy producing devices as part of an expanded fuel cycle, via input-output methods. Input-output analysis allows comparisons of direct and system wide impacts. Throughout the analysis, uncertainties must be explicitly recognized in the results, including uncertainty in validity of data and uncertainty in choice of appropriate models. No single method of comparative risk assessment is fully satisfactory each has its limitations. By use of several methods progress was made in understanding the relative impact of energy technologies. DOE

N83-33376# Du Pont de Nemours (E. I.) and Co., Aiken, S.C. Savannah River Lab.
SEASONAL EFFECTS ON GROUND WATER CHEMISTRY OF THE OUACHITA MOUNTAINS. NATIONAL URANIUM RESOURCE EVALUATION PROGRAM
K. F. Steele, W. M. Fay, and P. N. Cavendor Aug. 1982 64 p refs
(Contracts DE-AC09-76SR-00001; DE-AC13-76GJ-01664)
(DE83-001216; GJBX-199-82; DPST-81-141-24) Avail: NTIS HC A04/MF A01

Samples from 13 ground water sites (10 springs and 3 wells) in the Ouachita Mountains were collected nine times during a 16-month period. Daily sampling of six sites were carried out over an 11 day period, with rain during this period. Finally, hourly sampling was conducted at a single site over a 7 hour period. The samples were analyzed for pH, conductivity, temperature, total alkaliinity, nitrate, ammonia, sulfate, phosphate, chloride, silica, Na, K, Li, Ca, Mg, Sr, Ba, Fe, Mn, Zn, Cu, Co, Ni, Pb, Hg, Br, F, V, Al, Dy, and U. Despite the dry season during later summer, and wet seasons during late spring and late fall in the Ouachita Mountain region, there was no significant change in the ground water chemistry with season. Likewise, there was no significant change due to rain storm events (daily sampling) or hourly sampling. DOE

N83-33377# Battelle Pacific Northwest Lab., Sequim, Wash. Marine Research Lab.
EFFECTS OF CHLORINE ON MARINE BENTHOS Final Report
J. R. Vanderhorst Oct. 1982 102 p refs Sponsored by EPRI (EPRI Proj. 1224-4)
(DE83-900543; EPRI-EA-2696) Avail: NTIS HC A06/MF A01

Studies were conducted to investigate the effects of chlorination on epibenthic communities in open microcosms and to evaluate open-microcosm methodology. A single experiment provided for two years of exposure to target concentrations of 10 and 50 ppB of chlorine-produced oxidants (CPO) in sea water. Continuous and intermittent chlorination regimes were used at each of the concentrations. The experiment was conducted in triplicate and included triplicate controls not receiving chlorination. There was an increase in the number of species for communities receiving each of the treatments, but there were significant ($p = 0.05$) differences in the rate of increase between intermittent and continuous chlorination regimes and between the two target concentrations within each of the regimes. Continuously chlorinated communities increased less rapidly in the number of species than did intermittently chlorinated communities. Communities receiving 50 ppB CPO increased in the number of species less rapidly than did communities receiving 10 ppB CPO ($p = 0.05$). There were significant ($p = 0.05$) effects on community complexity attributable to the distance between microcosms and the central head tank supplying all microcosms. DOE

N83-33378# Illinois Univ., Urbana. Inst. for Environmental Studies.
APPLICATION AND VERIFICATION STUDIES OF TARGET-TRANSFORMATION FACTOR ANALYSIS AS AN AEROSOL-RECEPTOR MODEL
Philip K. Hopke, Kathryn G. Severin, and Shau-Nong Chang 1982 19 p refs Presented at the Conf. on Receptor Models Applied to Contemporary Pollution Problems, Danvers, Mass, 18 Oct. 1982
(Contracts DE-AC02-80EV-10403; EPA-68-02-3449)
(DE83-001365; DOE/EV-10403/9; CONF-821081-1) Avail: NTIS HC A02/MF A01

For several years, target transformation factor analysis (TTFA) has been under development for use in aerosol mass apportionment studies. There are several approaches to applying TTFA depending on the nature of the correlation matrix used. The correlation between the measured variables (R-mode) or between the particle samples (Q-mode) can be employed as the basis for the analysis. A detailed description of these two approaches is presented. These methods are then applied to a created data set prepared by the National Bureau of Standards from known source profiles and a dispersion model. The ability of both modes to resolve these data sets has been tested with these data with the result that for this data set, the R-mode appears to give suprior results. DOE

N83-33379# Los Alamos Scientific Lab., N. Mex.
LONG-TERM EXPOSURE OF SUP 238 PuO SUB 2 TO A TERRESTRIAL ENVIRONMENT
James H. Patterson, Benmimen Herrera, Gilbert B. Nelson, Frederick J. Steinkruger, George M. Matlack, and Daniel Pavore Dec. 1982 10 p refs
(Contract W-7405-eng-36)
(DE83-005607; LA-9487-MS) Avail: NTIS HC A02/MF A01

In many space missions that use radioisotope thermoelectric generators, 238PuO2 is used as the source of heat. We exposed some of this heat-source material to simulated terrestrial environments for an 8-yr period. During this time we monitored the release of plutonium to water, air, and soil. Plutonium was found in the air, especially after the beginning of a rain, and in the water that percolated through the soil after a rain, but the major part of the plutonium was held in the soil. DOE

N83-33380# Oak Ridge National Lab., Tenn.
INTERACTIONS OF GASEOUS-POLLUTANT AND ACID-RAIN EFFECTS
David S. Shriner 1983 10 p refs Presented at the Acid Rain Program Review Meeting, Raleigh, N.C., 21 Feb. 1983
(Contract W-7405-eng-26)
(DE83-009127; CONF-830216-4) Avail: NTIS HC A02/MF A01

The significance of individual and combined effects of gaseous pollutants and acid rain on plant growth and development was examined. The importance of pollutant interactions at concentrations, combinations and exposure frequencies typical of the eastern regional environment is determined. Laboratory, greenhouse, and field studies are designed to establish pollutant concentration thresholds for damage from SO2, O3, NC/sub X/, and acid rain. The visible injury thresholds and growth and yield thresholds for a variety of cultivars of bean, wheat, radish, tomato, and loblolly

pine is determined and it is found that thresholds vary within cultivars of a species and between species. DOE

N83-33381# World Meteorological Organization, Geneva (Switzerland).
LONG RANGE TRANSPORT OF SULFUR IN THE ATMOSPHERE AND ACID RAIN
1983 57 p refs Lectures presented at 33rd WMO Executive Comm., Geneva, 1981
(WMO-603; ISBN-92-63-10603-7) Avail: NTIS MF A01; print copy available at WMO, Geneva

The environmental effects of acid rain; the European air pollution monitoring and evaluation program on long range transport of pollution; and the health, ecological and aesthetic impact of acid deposition were discussed. For individual titles, see N83-33382 through N83-33384.

N83-33382# Hydrometeorological Centre of the USSR (Moscow).
ACID RAIN AND ITS ENVIRONMENTAL EFFECTS
Ju. A. Izrael *In* WMO Long Range Transport of Sulfur in the Atmosphere and Acid Rain 1983 p 1-15 refs (For primary document see N83-33381 21-45)
Avail: NTIS MF A01; print copy available at WMO, Geneva

The effects of the emission of 200 million tons of sulfur dioxide into the atmosphere each year are summarized. Transport theory of sulfur dioxide and its derivatives in the atmosphere is outlined. Chemical transformation in the atmosphere and wash-out are described. International cooperation in controlling transboundary air pollution is discussed. Measures to combat long range pollution are proposed. Author (ESA)

N83-33383# Meteorological Office, Bracknell (England).
A REVIEW OF THE EUROPEAN EMEP PROGRAMME ON THE LONG-RANGE TRANSPORT OF POLLUTION, AND SOME IDEAS ON HOW TO TREAT WET DEPOSITION
F. B. Smith *In* WMO Long Range Transport of Sulfur in the Atmosphere and Acid Rain 1983 p 16-38 refs (For primary document see N83-33381 21-45)
Avail: NTIS MF A01; print copy available at WMO, Geneva

A network of air pollution monitoring stations was established across Europe. Meteorological Synthesizing Centers (in Oslo and Moscow) developed trajectory models which are run operationally to give daily fluxes, concentrations and depositions of sulfur polluants. Wet deposition is deduced from rainfall fields which are spatially and temperally smoothed. The smoothing results in underestimation of transport to distant receptors. Introduction of stochastic concepts offers hope of improvement. Author (ESA)

N83-33384# Atmospheric Environment Service, Ottawa (Ontario).
ACID DEPOSITION: DISTRIBUTION AND IMPACT
D. M. Whelpdale *In* WMO Long Range Transport of Sulfur in the Atmosphere and Acid Rain 1983 p 39-53 refs Sponsored by Norges Teknisk-Naturvitenskapelige Forskningraad and Norsk Inst. for Luftforskning (For primary document see N83-33381 21-45)
Avail: NTIS MF A01; print copy available at WMO, Geneva

Pollution monitoring programs in Europe and North America are described. The effects of acid rain and dry deposition of sulfur compounds on human health, buildings, ecocystems, soils, and water are discussed. Author (ESA)

N83-33385# California Univ., Livermore. Lawrence Livermore Lab.
ENVIRONMENTAL IMPACT STATEMENT Final Report
Jul. 1982 712 p refs Sponsored by DOE Prepared in cooperation with Sandia Labs, Livermore, Calif.
(DE82-016322; DOE/EIS-0028) Avail: NTIS HC A99/MF A01

The potential impacts associated with current operation are assessed. Alternatives considered to current operation of the laboratories include: (1) shutdown and decommissioning, (2) total as partial relocation, (3) scaling down, and (4) wide use of alternative technologies. Author (GRA)

N83-33386# TRC Environmental Consultants, Inc., East Hartford, Conn.
EVALUATION OF RURAL AIR QUALITY SIMULATION MODELS
Richard Londergan, David Minott, David Wackter, Thomas Kincaid, and David Bonitata Research Triangle Park, N.C. EPA Oct. 1982 306 p refs
(Contract EPA-68-02-3514)
(PB83-182758; EPA-401/4-83-003) Avail: NTIS HC A14/MF A01 CSCL 13B

The results of a comprehensive evaluation of rural point source air quality simulation models using routinely collected data around the Clifty Creek power plant are summarized. Numerous tabulations of each model's performance in terms of statistical measures of performance recommended by the American Meteorological Society are given. No attempt is made to interpret the statistics or to provide direction to the reader, lest reviewers might be biased in making an evaluation of the models. GRA

N83-33387# Environmental Research and Technology, Inc., Westlake Village, Calif.
CAPTIVE AIR EXPERIMENTS IN SUPPORT OF PHOTOCHEMICAL KINETIC MODEL EVALUATION: PHASE 1 Final Report
D. Grosjean, A. Lloyd, R. J. Countess, F. Lurmann, and K. Fung Nov. 1983 282 p refs
(PB83-189506; ERT/P-A764-500; CRC-APRAC-CAPA-17-19-80) Avail: NTIS HC A13/MF A01 CSCL 13B

The methods and results of a captive air study conducted in Los Angeles, California, to experimentally evaluate the Empirical Kinetic Modeling Approach is discussed. An additional objective was to generate an experimental data base for reactive hydrocarbons, including aldehydes, in Los Angeles air, for testing existing and future computer kinetic photochemical models. The experimental phase of the project also provided a sampling platform for measurements and interlaboratory comparisons of major nitrogenous pollutants. Author (GRA)

N83-33388# Geological Survey, University, Ala.
ALABAMA COASTAL REGION ECOLOGICAL CHARACTERIZATION. VOLUME 2: A SYNTHESIS OF ENVIRONMENTAL DATA
Patrick E. ONeil and Maurice F. Mettee Jun. 1982 368 p
(Contract DI-14-16-0009-80-1016)
(PB83-190009; FWS/OBS-82/42-Vol-2) Avail: NTIS HC A16/MF A01 CSCL 13B

A detailed description of the natural environment of coastal Alabama relative to its biological, geological, and hydrological resources and processes is given. A conceptual model of energy flow through major coastal ecosystems (freshwater, coastal terrestrial, estuarine and outer continental shelf) is given. Also included are detailed discussions and models of the estuarine ecosystem and one of its components, the marsh, as it relates to coastal Alabama. GRA

N83-33389# Geological Survey, University, Ala. Environmental Div.
ALABAMA COASTAL REGION ECOLOGICAL CHARACTERIZATION. VOLUME 3: A SOCIOECONOMIC STUDY
John H. Friend, Madeleine Lyon, Nancy N. Garrett, John L. Borom, and Judy Ferguson Oct. 1982 397 p refs Sponsored in part by the Bureau of Land Management
(Contract DI-14-16-0009-80-1016)
(PB83-190017; FWS/OBS-81/41; LC-82-600554) Avail: NTIS HC A17/MF A01 CSCL 13B

A socioeconomic study consisting of nine topics discussing the social and economic climate coastal Alabama is given. These nine topics are: social and demographic characteristics, industrial and residential development, agricultural production, minerals production, commercial fishing, transportation, recreation/tourism industry, multiple use conflicts, and environmental issues and regulations. Also included is an extensive appendix containing tabular data supporting the discussions. GRA

N83-33241# Academy of Sciences (USSR), Moscow.
MATHEMATICAL CONCEPT OF GEO- AND ECOSYSTEMS

STABILITY AS A CHARACTER IMPORTANT FOR MONITORING
V. A. Svetlosanov *In its* Geosystem Studies for Monitoring 1981 p 20-26 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

N83-33244# Academy of Sciences (USSR), Moscow.
BIOENERGETICAL ASPECTS OF ECOLOGICAL MODELS AND THEIR CLASSIFICATION
I. I. Sventitsky and I. I. Tkatchenko *In its* Geosystem Studies for Monitoring 1981 p 46-56 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N83-33390 Institut d'Aeronomie Spatiale de Belgique, Brussels.
ON THE CHOICE OF BOUNDARY CONDITIONS FOR THE MATCHING OF KINETIC TO HYDRODYNAMIC POLAR WIND MODELS
M. Scherer 1982 22 p refs Submitted for publication
(Aeronomica-Acta-A-247-1982) Avail: Issuing Activity

Kinetic polar wind models based on an asymmetric anisotropic Maxwellian at the exobase are discussed. These models depend on four parameters which, in principle, can be determined by imposing fixed values for the number density, the flow speed, the temperature and the temperature anisotropy at the exobase. It is shown, however, that not any arbitrary set of values for these quantities can be chosen but that forbidden regions do exist.
Author (ESA)

N83-33391 Institut d'Aeronomie Spatiale de Belgique, Brussels.
STRATOSPHERIC OZONE MEASUREMENTS BY SOLAR ULTRAVIOLET ABSORPTION
S. Roeland, C. Lippens, and P. C. Simon 1983 22 p refs Submitted for publication
(Aeronomica-Acta-A-258-1983) Avail: Issuing Activity

Vertical distributions of ozone in the stratosphere were determined by balloon-borne ultraviolet differential absorption using the Sun as a source. The filter radiometer and the data processing are described. Results obtained between altitudes of 22 and 32 km during an intercomparison ozone campaign are discussed.
Author (ESA)

N83-33392 Institut d'Aeronomie Spatiale de Belgique, Brussels.
MATERIAL FROM THE EL CHICHON VOLCANO ABOVE SPAIN ON MAY 3, 1982: ONE MONTH AFTER THE ERUPTION
M. Ackerman and C. Lippens 1983 23 p refs Submitted for publication
(Aeronomica-Acta-A-268-1983) Avail: Issuing Activity

Stratospheric dust layers photographically observed in the altitude range 16 to 28 km from a balloon at 36.6 km over southern France are identified as originating from the eruption of the Mexican El Chichon volcano. The identification is compatible with the zonal air motions leading to lidar detections over Japan, United States and Italy. The observations confirm the eastward motion of part of the injected material below 20 km altitude and the westward motion above this. They imply a northward component of the meridional motion of the order of 20 deg (from 17 to 37 deg N) in one turn around the Earth. The observation of scattered sunlight in blue and red light allows optical properties of the aerosol implied by the wavelength dependence of the scattering efficiency being highly variable, particularly above the Junge layer, to be deduced.
Author (ESA)

N83-33393 Royal Aircraft Establishment, Farnborough (England).
UPPER-ATMOSPHERE ZONAL WINDS FROM SATELLITE ORBIT ANALYSIS
D. G. King-Hele and Doreen M. C. Walker 23 Dec. 1982 67 p refs
(RAE-TR-82126; RAE-SPACE-622; BR87436) Copyright. Avail: Issuing Activity

We review and interpret the values of upper-atmosphere rotation rate (zonal winds) obtained by analyzing satellite orbits determined from observations. The history of the method is outlined, the basic principles are explained, objections to the method are answered, and three examples are given. Existing analyses of the atmospheric rotation rate A are critically reviewed. It is indicated that the value of A (in rev/day), averaged over both local time and season, increases from 1.0 at 125 km to 1.22 at 325 km and then decreases to 1.0 at 430 km and 0.82 at 600 km. The value of A is higher in the evening (18-24 h), with a maximum value (near 1.4) corresponding to a west-to-east wind of 150 m/s at heights near 300 km. The value of A is lower in the morning (06-12 h), with east-to-west winds of order 50 m/s at heights of 200-400 km. There is also a consistent seasonal variation, the values of A being on average 0.15 higher in winter and 0.1 lower in summer than the average seasonal value. No significant variation with solar activity is found, but there is a slight tendency for a greater rotation rate at lower latitudes for heights above 300 km. Unexpectedly, the values for the 1960s are found to be significantly higher than those for the 1970s. Finally, these observational values are compared with the theoretical global model of Fuller-Rowell and Rees. Some differences in the mean values are found.
Author (ESA)

N83-33394# National Oceanic and Atmospheric Administration, Boulder, Colo. National Geophysical Data Center.
CATALOG OF IONOSPHERE VERTICAL SOUNDINGS DATA
Raymond O. Conkright, ed. and H. Irene Brophy, ed. Jul. 1982 111 p
(UAG-85) Avail: NTIS HC A06/MF A01

All B.1 data (International Council of Scientific Unions designation) held at World Data Center A, some B.1 data held elsewhere, and all vertical sounding stations known to have operated are listed in this catalog. Data type and the key to symbols are given along with an alphabetical listing of the data holdings. Data publications available, dates of special observational intervals, and directions for ordering are included.
A.R.H.

N83-33395*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SENSITIVITY /COMPARISON STUDY BETWEEN THE JACCHIA 1970, 1971, AND 1977 UPPER ATMOSPHERIC DENSITY MODELS
Dale L. Johnson Aug. 1983 136 p refs
(NASA-TM-82534; NAS 1.15:82534) Avail: NTIS HC A07/MF A01 CSCL 04A

The neutral upper atmospheric models for the Earth's thermosphere currently used in NASA-MSFC programs are the Jacchia 1970 (J70), 1971 (J71), and 1977 (J77). The Jacchia 1970 model (modified) is used in all MSFC orbital mechanics analyses. Since total density and its variations are the main environmental parameters of interest in orbital lifetime and attitude control studies, the total neutral density was selected for this analysis. This report presents the results of a parametric study of the total density (at 400 km altitude) as computed with three MSFC/Jacchia models. The sensitivity of each of the density models at the summer solstice to varying solar conditions (flux) and geomagnetic (index) values is discussed.
Author

N83-33396*# Texas Univ., Dallas. Center for Space Sciences.
MAGNETIC DEFLECTION ION MASS SPECTROMETER EXPERIMENT FOR ATMOSPHERE EXPLORER Final Report
J. H. Hoffman and W. B. Hanson Dec. 1982 5 p refs
(Contract NAS5-11406)
(NASA-CR-170560; NAS 1.26:170560) Avail: NTIS HC A02/MF A01 CSCL 04A

The magnetic ion mass spectrometer was carried aboard Atmosphere Explorer C and Atmosphere Explorer D. The instrument measures the relative abundance of ionic species with very high sensitivity and very high mass resolution. Thus isotopic ratios for various ion species can be examined and minor ion species such as O(++), N(++), and H(+) can be detected when their relative abundance is very small. These instruments functioned with no critical internal failures but the premature loss of the AE-D spacecraft after only a few months of operation has led to an emphasis of scientific achievement from AE-C. The very long lifetime of AE-C coupled with the prolonged time that this spacecraft spent near the F-region peak led to the accumulation of very large count numbers in the channeltron detectors. Author

N83-33397# European Space Agency, Paris (France).
SIXTH ESA SYMPOSIUM ON EUROPEAN ROCKET AND BALLOON PROGRAMS AND RELATED RESEARCH
W. R. Burke, comp. Jun. 1983 500 p refs Partly in ENGLISH and FRENCH Symp. held at Interlaken, Switzerland, 11-15 Apr. 1983
(ESA-SP-183; ISSN-0379-6566) Avail: NTIS HC A21/MF A01

National balloon and rocket sounding programs; the energy budget of the middle atmosphere; middle atmosphere physics projects; range facilities; ionospheric-magnetospheric coupling; measuring techniques; ground based observations; materials and life science programs; and astrophysics projects were discussed. For individual titles, see N83-33398 through N83-33472.

N83-33398# Centre National d'Etudes Spatiales, Paris (France).
THE FRENCH SPACE RESEARCH PROGRAM USING SOUNDING ROCKETS AND BALLOONS [LE PROGRAMME FRANCAIS DE RECHERCHE SPATIALE EN FUSEES-SONDES ET EN BALLONS]
M. Auger *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 3-6 In FRENCH (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

Sounding rocket astronomy, aeronomy, and materials science programs are listed, and balloon-borne biology and space physics studies are outlined. Stratospheric balloons of up to 1 million cum, and long duration flight (up to 126 days) balloons are used. Author (ESA)

N83-33399# Bundesministerium fuer Forschung und Technologie, Bonn (West Germany).
THE GERMAN SCIENTIFIC BALLOON AND SOUNDING ROCKET PROGRAM
M. Otterbein and A. F. Dahl (DFVLR, Cologne) *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 7-10 (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

Sounding rocket projects in astronomy, aeronomy, magnetosphere and materials science under microgravity are summarized. Balloon projects emphasize astronomy and aeronomy. A 1m EUV telescope was launched with an ARIES rocket. Due to a failure in the acquisition control system the scientific output was poor, but the payload was recovered almost undamaged and will be used for a reflight. About 50 rockets and 18 balloons were launched to study energetic processes in the mesosphere and lower thermosphere during geomagnetic disturbances as part of the Energy Budget Campaign. A balloon-borne gamma ray telescope observed the galactic center. Star formation regions were discovered by FIR spectrophotometry. Author (ESA)

N83-33400# Stockholm Univ. (Sweden). Arrhenius Lab.
THE SWEDISH SOUNDING ROCKET AND BALLOON PROGRAM
G. Witt *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 11-13 (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

The Swedish sounding rocket and balloon program studies: magnetosphere and ionosphere physics, including measurements of charged particles and electrical and magnetic fields; upper atmosphere physics and chemistry, including studies of the composition of the atmosphere at altitudes of 80 to 150 km; astrophysics, comprising ultraviolet and infrared studies of stars and galaxies; and materials science in microgravity, comprising experiments in solidification of alloys and diffusion processes in liquid metals. Studies of photochemistry and transport processes in the atmosphere, active chemical release experiments and hot plasma dynamics in a pulsating aurora are planned. Author (ESA)

N83-33401# Bergen Univ. (Norway). Dept. of Physics.
THE NORWEGIAN SCIENTIFIC BALLOON AND SOUNDING ROCKET PROGRAM, 1983-1985
F. Soeraas and A. Gundersen (Royal Norwegian Council for Scientific and Industrial Research, Oslo) *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 15-19 (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

Investigations of the polar upper atmosphere and studies of ionospheric/magnetospheric processes are outlined. The Poleward Leap rocket studies the detailed latitudinal profiles of particles and fields in the ionosphere along a long-range trajectory through the newly expanded high latitude auroral precipitation region. The Middle Atmosphere Program Winter in Northern Europe program studies the structure of the middle atmosphere, its motions and composition during winter at high latitudes. Stratospheric warming is emphasized. The BUGATTI 3/IOMAS project investigates the arctic mesosphere and lower thermosphere during winter, especially during a major stratospheric warming. The MAIMIK project examines electron energy transfer in the ionosphere. Balloon-borne instruments study phenomena associated with auroral particle precipitation. Author (ESA)

N83-33402# Science Research Council, Chilton (England). Rutherford Appleton Lab.
SUMMARY OF THE 1957-1982 UK SCIENTIFIC RESEARCH SOUNDING ROCKET PROGRAMME
J. T. Delury *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 21-24 (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

The Skylark, Petrel, Fulmar and Skua sounding rockets are described and over 750 flights using these rockets are summarized. Astrophysical and solar-terrestrial physics phenomena; the magnetosphere; space plasmas; and neutral winds were studied. Rockets were also used for X-ray astronomy. Author (ESA)

N83-33403# Graz Univ. (Austria). Dept. of Communications and Wave Propagation.
SOUNDING ROCKET AND BALLOON PROGRAMS IN AUSTRIA AND RELATED ACTIVITIES
W. Riedler and J. Ortner (Austrian Solar and Space Agency) *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 25-28 refs (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

Rocket-borne measurements of plasma densities are summarized. Balloon-borne studies of magnetospheric bremsstrahlung X-rays, electric fields and auroral photoemission are mentioned. Austrian participation in Soviet space programs and the first Spacelab payload is outlined. Author (ESA)

N83-33404# Bonn Univ. (West Germany). Inst. fuer Physik.
SMALL SCALE DENSITY FLUCTUATIONS AT HOMOPAUSE ALTITUDES
F.-J. Luebken and U. vonZahn *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 31-37 refs (For primary document see N83-33397 21-46) (Grant BMFT-WRK-0275-010E047-0)
Avail: NTIS HC A21/MF A01

Fluctuations of tens of meters to a few kilometers scale

length of the nitrogen number densities in the altitude region 100 to 120 km were measured by two rocket-borne mass spectrometers during the Energy Budget Campaign. The observed density fluctuations are described and their power spectra are discussed as a function of altitude. An inertial subrange at 100 km altitude comprising sizes from 0.1 to 2 km is indicated. For all scale sizes < 0.1 km the spectral power is considerably larger during geomagnetically quiet periods than during moderately disturbed periods. Increase in the Kolmogorov microscale above 110 km is hard to ascertain because of instrument noise. Author (ESA)

N83-33405# Norwegian Defence Research Establishment, Kjeller.
TURBULENT TRANSPORT COEFFICIENTS DERIVED FROM ROCKET MEASUREMENTS IN THE LOWER IONOSPHERE
O. Andreassen, T. A. Blix, B. Grandal, and E. V. Thrane *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 39-40 refs (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

Rocket-borne spherical gridded electrostatic probes measured ionospheric positive ion current during the Energy Budget Campaign. Spectral analysis of the relative density fluctuations indicates turbulence below 100 km. The most strongly developed turbulent structures appear during periods of strong magnetic disturbance. A moderately disturbed day shows the least turbulence. Author (ESA)

N83-33406# Bern Univ. (Switzerland). Inst. fuer Physik.
WIND AND TEMPERATURE INDUCED EFFECTS ON MESOSPHERIC ION COMPOSITION AND INFRARED MINOR CONSTITUENTS
E. Kopp and C. R. Philbrick (AFGL, Hanscom AFB, Mass.) *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 41-46 refs (For primary document see N83-33397 21-46)
(Grants SNSF-2.255.81; SNSF-2.609.82)
Avail: NTIS HC A21/MF A01

The positive ion composition, temperature and wind profiles were measured independently by rockets during the Energy Budget Campaign. Ion chemical models of the D region predict a strong temperature dependence for the density distribution of the proton hydrates with different hydration order. Mesospheric temperature profiles derived from a steady state ion chemical model are compared with measured scale height temperature from the accelerometer instrument falling sphere experiments. The effect of strong horizontal neutral air transport and ion drag become evident in the total positive ion density profiles, derived from the ion mass spectrometer measurements. Nitric oxide profiles, inferred from the ion composition measurements, reveal a pronounced density depletion at 97 km and at 93 km. In both cases the features correlate with regions of high wind and may result from transport effects on the nitric oxide. Author (ESA)

N83-33407# Graz Univ. (Austria). Dept. of Communication and Wave Propagation.
ION PRODUCTION AND LOSS AT DIFFERENT LEVELS OF GEOMAGNETIC DISTURBANCE DURING THE ENERGY BUDGET CAMPAIGN
M. Friedrich and K. M. Torkar (Austrian Academy of Sciences, Graz) *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 47-51 refs Sponsored by Austrian Science Foundation (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

Energetic charged particle population detectors were carried by sounding rockets in the Energy Budget Campaign. Ion production is found to dominate over all other night-time production processes even under almost quiet conditions. Number densities of electrons and positive ions were also studied. The electron loss rate was derived as a function of altitude under different levels of ionospheric disturbance. Despite the large scatter the loss rate is found to decrease systematically with increasing ion production (or electron density). Such behavior is expected from theoretical ion-chemical models, but dependence on ion production or electron density is found to be much stronger than predicted. Author (ESA)

N83-33408# University Coll., London (England). Dept. of Physics and Astronomy.
INTERFEROMETRIC AND DOPPLER IMAGING STUDIES OF THE AURORAL THERMOSPHERE FROM KIRUNA GEOPHYSICAL INSTITUTE
D. Rees, P. Charleton, N. Lloyd, A. Steen (Kiruna Geophysical Inst., Sweden), and G. Witt (Stockholm Univ.) *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 53-57 refs (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

High resolution Fabry-Perot interferometer (FPI) winter night observations with clear skies are discussed. A standard FPI observed the OI 630 nm airglow/auroral emission to produce wind and temperature data near 240 km altitude. A triple-etalon FPI made high resolution studies of band spectra and extended the observing period into bright twilight. A prototype Doppler imaging system was successfully tested. Highly disturbed thermospheric conditions were recorded, including horizontal winds in excess of 850 m/sec and vertical winds of over 100 m/sec during strong geomagnetic substorms. Author (ESA)

N83-33409# Stockholm Univ. (Sweden). Arrhenius Lab.
ON SOME CURRENT PROBLEMS OF AURORAL AND AIRGLOW SPECTROSCOPY
J. Stegman and G. Witt *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 59-61 refs (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

Research problems in rocket-borne atmospheric spectroscopy, including vibrational quenching of OH bands, and derivation of NO concentrations from continuum measurements, are discussed. It is concluded that understanding of many light-producing atmospheric processes is incomplete. Laboratory measurements of the relevant cross sections and lifetimes are needed. Rocket-borne measurements which yield snapshot information about the atmosphere need to be complemented by ground based, long term spectroscopic observations. Author (ESA)

N83-33410# Utah State Univ., Logan.
INFRARED RADIATION AND ENERGY TRANSFER IN THE AURORAL MESOSPHERE AND LOWER THERMOSPHERE
J. C. Ulwick and K. D. Baker *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 65-75 refs (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

The principal IR emitters in the 1 to 20 micron wavelength range are identified, and their excitation mechanisms and efficiency of production from electron deposition under auroral conditions are discussed. The contribution of IR emitters to the energy input/loss process through transport is considered, particularly for CO2 at 4.3 microns and NO at 5.3 microns. The effects of Joule heating are considered, and results of IR measurements during the Energy Budget Campaign are presented. Although the primary active IR molecules are minor constituents, even in the undisturbed night atmosphere, IR energy fluxes are significant. Measurements show that the dominant IR contribution to the local radiation budget below 100 km is CO2 at 15 microns. During auroral conditions enhancements of IR emitters with a strong dependence on energy deposition are observed. Joule heating of the upper atmosphere does not change the NO, O3, or CO2 radiances. Author (ESA)

N83-33411# Studien G.m.b.H., Freiburg (West Germany).
ROCKET-BORNE INSTRUMENTS IN THE EUV-VISIBLE SPECTRAL RANGE DURING AURORAL EVENTS **c19**
P. B. Seidl, G. Stasek, C. Wita, and G. Schmidtke (Fraunhofer-Inst. fuer Physikalische Messtechnik) *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 77-81 refs (For primary document see N83-33397 21-46)

(Contract BMFT-01-OE-087-ZK/WFWRK-275/2)
Avail: NTIS HC A21/MF A01

Auroral emissions were measured by rocket-borne spectrometers and photometers in the wavelength range from 50 to 640 nm, during the Energy Budget Campaign. The total energy flux of the electromagnetic radiation in that range is 0.61 mW/sqm for a diffuse aurora, and 0.67 mW/sqm for a stable arc at altitudes of 170 km and 190 km, respectively. Selected emissions show distinct differences in their spatial distribution for the auroral events observed according to different energy distributions of the incoming electron flux. Author (ESA)

N83-33412# Wuppertal Univ. (West Germany).
MESOSPHERIC WATER VAPOR
K. U. Grossmann *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 83-87 refs (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

Measured mesospheric and thermospheric water vapor mixing ratios are compared to theoretical model predictions. It is found that the large scatter of the measured mixing ratio profiles is mainly due to the natural variability of the H2O concentration. Individual profiles exhibit fluctuations not predicted by models. Author (ESA)

N83-33413# Science Research Council, Chilton (England). Rutherford Appleton Lab.
SIMULTANEOUS OBSERVATIONS OF E-REGION IRREGULARITIES BY GROUND-BASED AND ROCKET-BORNE TECHNIQUES
P. H. G. Dickinson, D. J. Mackinnon, R. Grabowski (Fraunhofer Inst. fuer Physikalische Messtechnik), H. Wolf (Fraunhofer Inst. fuer Physikalische Messtechnik), C. Hanuise (Toulon Univ., France), J. P. Villian (Toulon Univ., France), E. Nielsen (Max-Planck Inst. fuer Aeronomie, Katlenburg-Lindau, West Germany), E. V. Thrane (Norwegian Defence Research Establishment, Kjeller), and O. Andreassen (Norwegian Defence Research Establishment, Kjeller) *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 89-101 refs (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

Night E region irregularities were observed in winter in Scandinavia using radar and rocket-borne probes. The power spectra of ionization variability differ, having spectral indicies of -5/3 on one night and 0 on another. The measurements were made after the decay of magnetic activity from + 300 to below + 100 gamma and in a trough of low ionospheric electric field. This means that the electrojet current and hence the generation of ion acoustic waves was locally weak and dying out. It is suggested that under these conditions the smaller scale inhomogeneities decay faster until an equilibrium is reached with energy derived from the decay of large scale waves in a manner analogous to the turbulent breakdown of neutral air flows. Author (ESA)

N83-33414# Bern Univ. (Switzerland). Inst. fuer Physik.
NEGATIVE ION COMPOSITION FOR DIFFERENT CONDITIONS IN THE MESOSPHERE
L. Andre *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 103-110 refs Sponsored by Swiss National Science Foundation (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

The negative ion composition in the altitude range 56 to 86 km was measured during the 1979 solar eclipse with a high resolution magnetic mass spectrometer. From these data an ion chemical model for negative ions in the D region was developed. The calculated profiles for 0-, O-2, Cl-, CO-3, HCO-3, NO-3 and CO-4 agree with the measurements. A great number of different heavy ions was measured. With the laboratory reaction rates for negative cluster ions, the model can not explain these heavy ions. The model was applied to conditions reported from the European Winter Anomaly Campaign 1976, The Noctilucent Cloud Campaign 1978 and from the Energy Budget Campaign 1980. Model calculations show very different negative ion compositions for different atmospheric conditions. Author (ESA)

N83-33415# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany).
E2: A HEAVY CLEAN PAYLOAD OF THE ENERGY BUDGET CAMPAIGN **c15**
G. Hummeltenberg *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 111-114 (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

Two 390 kg Skylark payloads with viewing angle 180 deg for the sensor of the infrared spectrometer were built. The spectrometer was equipped with a jettisonable cap. Cleanliness was assured by separate dusttight compartments and a special cleaning procedure at the launch site. Recovery by parachute and a turnover maneuver allowed the reuse of the payload and the main experiment. Author (ESA)

N83-33416# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.
NUMERICAL MODELING OF THE DYNAMICAL AND CHEMICAL STRUCTURE OF THE MIDDLE ATMOSPHERE
Susan Solomon and Rolando R. Garcia (National Center for Atmospheric Research) *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 117-122 refs (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

A two dimensional atmospheric model in which photochemistry and dynamics are coupled was developed. The model extends from pole to pole, from 16 to 116 km altitude. The importance of the interactions between dynamics and chemistry are examined, and the type of simulation model required is considered. Factors contributing to distributions of trace species in the mesosphere and stratosphere are discussed. It is suggested that the level of required model complexity varies with altitude and the species considered. The many uncertainties and approximations in dynamical and chemical descriptions are pointed out. Author (ESA)

N83-33417# Liege Univ. (Belgium). Inst. d'Astrophysique.
ROCKET MEASUREMENTS AND MODELING OF THE NITRIC OXIDE DISTRIBUTION IN THE THERMOSPHERE AND LOWER MESOSPHERE
J-Cl. Gerard, E. Deneye, and V. Singh (Roorkee Univ., India) *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 123-130 refs (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

Rocket and satellite measurements of the NO vertical distribution above 70 km are discussed. Seasonal and latitudinal effects clearly influence the magnitude of the E region maximum and the steepness of the vertical gradient below 100 km. One dimensional models give satisfactory results in regions where circulation does not strongly affect the distribution. Large differences between summer and winter profiles predicted at midlatitudes agree with observation. One dimensional models are also useful for modeling the diurnal variation of odd nitrogen for periods and locations when transport from the auroral zone is small. However, two dimensional models are necessary to investigate the global latitudinal distribution of NO even during quiet geomagnetic conditions. Particle precipitation and Joule heating play an important role because large amounts of odd nitrogen are produced and because they globally affect the temperature, wind and background composition fields. Author (ESA)

N83-33418# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.
MESOSPHERIC OZONE DEPLETION DURING SOLAR PROTON EVENTS
S. Solomon, G. C. Reid, D. W. Rusch (Colorado Univ., Boulder), and R. J. Thomas (Colorado Univ., Boulder) *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related

Res. Jun. 1983 p 131-135 refs (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

Proton fluxes observed by the NOAA 6 satellite were used to calculate ionization rates during two solar proton events. This ionization leads to the production of odd hydrogen radicals (H+OH+HO2) which catalytically destroy odd oxygen in the mesosphere and stratosphere. A one dimensional time dependent model was used to calculate the percentage change in ozone resulting from these events. The calculated ozone depletion is compared to that observed by the Solar Mesosphere Explorer satellite. Differences are attributed to the effect of changing solar zenith angle on the rate of H2O photolysis. Author (ESA)

N83-33419# Geneva Observatory (Switzerland).
VERTICAL DISTRIBUTIONS OF STRATOSPHERIC O3, NO2, AND NO3 AT NIGHT FROM BALLOONS
P. Rigaud (Station Scientific du Val Joyeux, Villepreux, France) and J. P. Naudet *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 137-140 refs (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

The vertical distributions of stratospheric O3, NO2 and NO3 were deduced from spectrometric measurements of bright rising stars and of the planet Venus using the tangent ray method. The NO2 absorption was detected in the 427 to 452 nm range. Spectra recorded between 642 and 672 nm yield the NO3 and O3 absorptions in the 662 nm band and the Chappuis band respectively. Results of four balloon flights are presented. Author (ESA)

N83-33420# Kernforschungsanlage, Juelich (West Germany). Inst. fuer Chemie 3: Atmosphaerische Chemie.
SAMPLING OF LONG LIVED TRACE GASES IN THE MIDDLE AND UPPER STRATOSPHERE
U. Schmidt, G. Kulessa, A. Khedim, D. Knapska, and J. Rudolph *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 141-145 refs (For primary document see N83-33397 21-46)
(Contract BMFT-FKW-25)
Avail: NTIS HC A21/MF A01

A light weight compact balloon-borne cryosampler which allows collection of 15 air samples with a total volume of 200 l (STP) in the stratosphere up to altitudes of 45 km was developed. Effects of contamination that might affect the concentration of long lived trace gases (H2, CO, CO2, CH4, N2O, chlorinated hydrocarbons, ethane, propane) were investigated in laboratory and flight tests. The design may also be used for the development of a light weight rocket-borne cryosampler to obtain profiles of trace gases up to altitudes of 70 km using an Orion sounding rocket as the launch vehicle. Author (ESA)

N83-33421# Bonn Univ. (West Germany). Inst. fuer Physik.
THE RESEARCH PROJECT WINTER IN NORTHERN EUROPE (WINE) OF THE INTERNATIONAL MIDDLE ATMOSPHERE PROGRAM (MAP)
U. vonZahn *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 147-159 refs (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

The MAP/WINE study of the structure and dynamics of the middle atmosphere above northern Europe during winter is outlined. The project measures the morphology of small scale dynamic features, in order to study the control exerted by gravity waves and tides on the mean flow in the mesosphere, and to develop improved parameterizations of the interactions of small scale dynamic processes with mesospheric temperature, structure, and mean flow. Sudden stratospheric warmings, their cause, the time history of their large scale spatial structures, and their effect on the mesosphere temperature and dynamics are investigated. The effects of dynamics and temperature structure on the distribution of minor constituents, including ionospheric plasma, in the middle atmosphere are examined. Remote sensing and in-situ techniques for measuring mesospheric parameters are compared. Author (ESA)

N83-33422# Wuppertal Univ. (West Germany).
THE MIDDLE ATMOSPHERE PROGRAM (MAP)/GLOBAL BUDGET OF STRATOSPHERIC TRACE CONSTITUENTS (GLOBUS) CAMPAIGN 1983
D. Offermann *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 161-166 (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

An international campaign of ground based, airplane, balloon and rocket investigations of stratospheric ozone and NOx constituents, atmospheric dynamics, and solar irradiation is outlined. The flight sequence and the roles of ground stations, ozone sondes, and radiosondes are described. Author (ESA)

N83-33423# Stockholm Univ. (Sweden). Arrhenius Lab.
OPTICAL TECHNIQUES FOR STUDYING ATMOSPHERIC PROPERTIES BY MEANS OF ROCKET-BORNE UV LIGHT SOURCES **c74**
A. Zuber, A. Lundin, and G. Witt *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 167-171 refs (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

Rocket and balloon-borne techniques for in-situ measurement of the vertical distribution of neutral gas constituents are reviewed. The Selective Optical Atmospheric Probe (SOAP) for middle atmosphere studies is introduced. The first version of SOAP was instrumented for noctilucent cloud studies and carried a pair of polarization photometers. Ionization chambers for observing direct solar UV radiation were used to extend the density measurements upward. The UV experiments failed due to contamination of optical surfaces during countdown. Purging with dry N2 solved this problem for SOAP 2. Optical active techniques prove useful in the measurement of minor constituents with high accuracy and precision. Study of the resonance scattering of air with a Kr line source indicates that with instrumental difficulties overcome, neutral density probes can deliver high resolution density profiles between 50 and 80 km. Author (ESA)

N83-33424# Bern Univ. (Switzerland). Inst. of Applied Physics.
WATER VAPOR DISTRIBUTION MEASURED IN THE MIDDLE ATMOSPHERE WITH AN AIRBORNE MICROWAVE RADIOMETER
K. F. Kunzi, E. Lobsiger, and G. K. Hartmann (Max-Planck Inst. fuer Aeronomie, Katlenburg-Lindau, West Germany) *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 173-174 refs Sponsored by Max-Planck-Gesellschaft and Swiss National Science Foundation (For primary document see N83-33397 21-46)
(Contract DFG-MICA-Az-Ha-1141/3-1)
Avail: NTIS HC A21/MF A01

Stratospheric and mesospheric water vapor was measured with an airborne microwave radiometer at 183 GHz as part of the Cold Arctic Mesopause mission. Two water vapor profiles are presented. Due to technical problems with the spectrum analyzers measurement accuracy is much reduced, but the profiles are consistent with measurements made over the Pacific Ocean. Author (ESA)

N83-33425# Centre National de la Recherche Scientifique, Verrieres-le-Buisson (France). Service d'Aeronomie.
PLANETARY AND GRAVITY WAVES AS SEEN BY LIDAR IN THE MIDDLE ATMOSPHERE
M. L. Chanin, A. Tarrago, and A. Hauchecorne *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 175-179 refs (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

Middle atmosphere temperature and density were continuously surveyed by lidar for 4 yr. Results for planetary and gravity wave related effects are presented. Planetary wave induced

perturbations occur in the whole middle atmosphere from October to March, coinciding with westerly winds in the stratosphere. Density and temperature profiles exhibit wave-like structures which could be due to tidal or gravity waves. Spectral Fourier analysis (spatial and temporal) reveals significant differences between summer and winter characteristics of gravity waves. Author (ESA)

N83-33426# Norwegian Defence Research Establishment, Kjeller.
DUAL STATION MESOPAUSE TEMPERATURE MEASUREMENTS DURING STRATWARM MESOSPHERIC PROJECT (SWAMP) 2: KJELLER, NORWAY (60 DEG N, 11 DEG E), WUPPERTAL, FEDERAL REPUBLIC OF GERMANY (51 DEG N, 7 DEG E)
T. A. Blix, R. Gerndt (Wuppertal Univ., West Germany), and G. Lange (Wuppertal Univ., West Germany) *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 181-184 refs (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

The mesopause temperature was measured by two ground based stations using infrared grating spectrometers with liquid nitrogen cooled detectors. Every 2 min. a spectrum of the OH(3,1) rotational vibrational transition in the near infrared was recorded. From the spectrum the temperature of the emitting layer at 85 km was computed. Spectral analysis, using the mean nightly temperature values, reveals regular long term oscillations of 2, 3.75, 6, 8.5, 11.0, 15 to 16 and 25 to 30 day periods, associated with atmospheric waves. Author (ESA)

N83-33427# Graz Univ. (Austria).
SUGGESTED CORRECTION TO THE AFGL REFERENCE ATMOSPHERE FOR USE IN THE HIGH-LATITUDE EUROPEAN SECTOR BASED ON COLLISION FREQUENCY MEASUREMENTS
K. M. Torkar and M. Friedrich *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 185-188 refs Sponsored by Austrian Science Foundation (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

The D region collision frequency data of 19 rocket flights from Scandinavia are used to construct departures from the U.S. Air Force reference atmosphere. The model is a qualitative indication for either (a) a correction for the AFGL model at high latitudes in general, or (b) a transformation term for use in the European sector. The new temperatures fall within 10% percentiles previously reported, supporting hypothesis (a). Satellite-borne radiance measurements give a standing wave number 1 which, at 80 km has a maximum in winter at 220 W and a minimum at 40 W. The exact magnitude and altitude of this temperature wave, however, can not readily be retrieved from the radiance data. Nonetheless, these observations qualitatively support hypothesis (b). Also, such a longitudinal variation of up to 10 K is given in the AFGL model, for altitudes below 60 km. Author (ESA)

N83-33428# Centre National d'Etudes Spatiales, Toulouse (France).
STATOSPHERIC BALLOON LAUNCH CENTERS [LES CENTRES DE LANCEMENTS DE BALLONS STRATOSPHERIQUES] c02
Pierre Vincent *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 191-194 refs In FRENCH (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

Balloon launching facilities for atmospheric sounding, including recoverable ocean flights, are outlined. A 1 million cum balloon reached 47 km altitude during a 6 hr flight. Flights with constant climb rate and stage by stage ascent are possible. Payloads weighing over 600 kg can be carried. Author (ESA)

N83-33429# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Hauptabt. Angewandte Datentechnik.
MOBILE ROCKET BASE (MORABA) PRESENTATION c14
R. Klein *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 195-199 (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

The mobile rocket base (MORABA) used for sounding rocket launches by the DFVLR applied data techniques division is presented. Apart from sounding rocket programs, the MORABA is also used for ground support of ESA projects, including the Giotto Halley's comet mission, and to receive meteorological satellite data. It was used to prove that it is possible to organize an installation to launch 300 to 400 kg satellites commercially.
Author (ESA)

N83-33430# Norwegian Defence Research Establishment, Kjeller. Space Activity Div.
FUTURE OPERATIONS AND INVESTMENTS AT THE ANDROYA ROCKET RANGE
K. Adolfsen, R. Bjurstroem, A. Gundersen, and I. Nyheim *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 201-203 (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

Improvements to the Andoya rocket range for the Middle Atmosphere Physics (MAP)/Winter in Northern Europe (WINE) project are outlined. Main improvements are to the control center, with better facilities for the telemetry station, experimenters' desks, payload checkout, data handling, and carpentry and machine workshops. A 150 sqm aluminum hall will house the cleaning facility for MAP/WINE payloads. Storage space for all MAP/WINE rocket motors and payloads is available. Author (ESA)

N83-33431# Swedish Space Corp., Kiruna.
ESRANGE, THE SWEDISH HIGH LATITUDE SOUNDING ROCKET, BALLOON AND SATELLITE FACILITY c14
Arne Helger *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 205-207 (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

A facility which can launch most types of sounding rockets including Terrier Black Brant and Aries, is presented. Geophysical, astronomical, meteorological and material science research activities are carried out in international cooperation. An extensive network of ground based scientific instrumentation is available. Land recovery is possible. The range is also equipped to release scientific balloons. A ground station for reception of data from remote sensing and scientific satellites is installed. Author (ESA)

N83-33432# Swedish Space Corp., Kiruna.
YEARLY VARIATIONS OF HIGH ALTITUDE WINDS (ABOVE 30 km) AT ESRANGE
Jan Englund *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 209-210 (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

Annual variations of winds above 30 km altitude were studied in order to achieve maximum flight time for high altitude balloons. Results indicate that the turn-around period in autumn is most favorable, with flight times between 20 to 60 hr. Author (ESA)

N83-33433# Swedish Space Corp., Kiruna.
NEW INSTALLATIONS AND EQUIPMENT AT ESRANGE c14
Gunnar Larsson *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 211-212 (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

At the Esrange rocket launching base 700 sqm office and accommodation space was built. A clean room for operations on payloads during integration and assembly was constructed. A timing system with a rubidium controlled operator with a stability of -100 billion/month was installed. Author (ESA)

N83-33434# Institute of Space and Astronautical Science, Tokyo (Japan).
SOUNDING ROCKET ACTIVITIES IN JAPAN

Ryojiro Akiba and Daikichiro Mori *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 213-218 (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

The ISAS K and S series sounding rockets and M-3s satellite launcher are presented. Facilities at the Kagoshima space center are described. Sounding rocket experiments include UV imaging of the solar surface; night time homospheric wind velocity measurement; studies of interplanetary dust; NO density profile measurement; altitude distribution measurement of oxygen molecules; and verification of predawn enhancement of airglow and photoelectron traveling from Australia. Author (ESA)

N83-33435*# Iowa Univ., Iowa City. Dept. of Physics and Astronomy.
NONSTATIONARY COUPLING BETWEEN THE MAGNETOSPHERE AND IONOSPHERE
C. K. Goertz *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 221-228 refs (For primary document see N83-33397 21-46)
(Grants NGL-16-001-043; NAGw-364; NAGw-386; NsG-7632; NSF ATM-81-11126)
Avail: NTIS HC A21/MF A01 CSCL 04A

Resonant coupling of large scale MHD waves to small scale kinetic Alfven waves is described. The small-scale waves drive field-aligned currents tens of micro A/sqm into the ionosphere with accelerated electrons of energies a few keV. Bounce resonant interaction with standing kinetic Alfven waves may precipitate higher energy electrons. East-west aligned arcs should be thinnest and move polewards relative to the plasma at the poleward edge. Downward travelling wave packets trap electrons between the wave front and the ionosphere whose energy is below the peak energy and whose phase-space density should be independent of the peak energy. Author (ESA)

N83-33436# Science Research Council, Chilton (England). Rutherford Appleton Lab.
ON THE ACCELERATION OF AURORAL ELECTRONS
D. S. Hall, D. A. Bryant, and R. Bingham *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 229-232 refs (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

A wave model for the electron acceleration that leads to discrete auroras is proposed. Measurements of accelerated electrons are used to deduce the wave spectrum and the nature of the waves responsible for the acceleration. The waves are identified as longitudinal electrostatic (Langmuir) waves. Generation of the waves by the streaming ions observed at the plasma sheet boundary is considered. It is demonstrated that sound turbulence produced by the ions leads to the generation of the required Langmuir waves. The development of the power profile of the ions, waves and electrons, between 20 RE and the atmosphere, is described, and it is shown that the ion power at 20 RE can account for the electron power observed close to the atmosphere. Author (ESA)

N83-33437# Oslo Univ. (Norway). Inst. of Physics.
AURORAL OVAL DYNAMICS IN RELATION TO SOLAR WIND-MAGNETOSPHERE INTERACTION
P. E. Sandholt *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 233-245 refs Sponsored by Norwegian Research Council for Science and Humanities (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

Photometric observations of dayside auroras are compared with simultaneous measurements of geomagnetic disturbances from meridian chains of stations on the dayside and on the nightside to document the dynamics of dayside auroras in relation to local and global disturbances. It is shown that the dayside auroral zone shifts equatorward and poleward with the growth and decay of the circum-oval/polar cap geomagnetic disturbance and with negative and positive changes in the north-south component of the interplanetary magnetic field (IMF). The geomagnetic disturbances associated with the auroral shift is identified as the DP2 mode. The equatorward and poleward movement of the dayside oval is explained in terms of a dayside current system which is intensified by a southward movement of the IMF vector. Author (ESA)

N83-33438# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.
THREE-DIMENSIONAL POTENTIAL STRUCTURE ABOVE AURORAL ARCS
Lars Block *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 247-252 refs (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

Three-dimensional models of the U-shaped equipotential structures above auroral arcs are discussed. Cold plasma convects into the structure along equipotential surfaces. Electrons are lost through precipitation. Current continuity is maintained by the generator which injects electrons and removes ions against the perpendicular electric field. The nature of the parallel electric field is discussed. It is shown that observations are inconsistent with a uniformly distributed parallel electric field and with a single strong double layer. The multitude of weak double layers and solitons seen on the S3-3 satellite agrees with known facts. Author (ESA)

N83-33439# European Space Research and Technology Center, Noordwijk (Netherlands). Space Science Dept.
OBSERVATIONS ON GEOS AND NEAR THE NORTHERN CONJUGATED MAGNETIC FIELD LINES
K. Knott *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 253-257 refs (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

Earth magnetic field was observed simultaneously at geostationary orbit by the GEOS 2 satellite and at the magnetically conjugated high latitude ionosphere by sounding rockets, balloons and ground based observatories. Results show that continuous observations using ground based facilities are best suited for quantitative determinations. The STARE radar facility is particularly successful. The value of measurements in conjunction with the EISCAT facility is underlined. Author (ESA)

N83-33440# Centre de Recherches en Physique de l'Environnement, Saint Maur des Fosses (France).
MEASUREMENT OF THE CROSS SPECTRUM OF HF ELECTROSTATIC WAVES IN AN AURORAL PLASMA
R. Pottelette and J. M. Illiano *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 259-261 refs Sponsored by CNES (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

A method for the metrology of space plasmas, based on the reception of electrostatic waves by a pair of small dipole antennas was tested in PORCUPINE project rocket experiments. Both dipoles received signals from the natural electrostatic microfield in the plasma; the cross spectrum of these random signals was measured. Data obtained during a weak auroral activity are presented. Natural electrostatic emissions were observed around the upper hybrid frequency and also around the three-halves harmonic of the electron gyrofrequency. A linear calculation shows that the amplitudes of these emissions are above the thermal noise level of the plasma. To explain the observations, it is necessary to take into account the presence of low-energy precipitating electrons (1 to 20 eV), which are highly anisotropic. Author (ESA)

N83-33441# Max-Planck-Institut fuer Aeronomie, Katlenburg-Lindau (West Germany).
FIRST RESULTS OF THE IN-SITU MEASUREMENTS OF THE HERO HEATING CAMPAIGN
G. Rose, B. Grandal (Norwegian Defence Research Establishment, Kjeller), E. Neske (Fraunhofer Inst. fuer Physikalische Messtechnik),

W. Ott (Fraunhofer Inst. fuer Physikalische Messtechnik), K. Spenner (Fraunhofer Inst. fuer Physikalische Messtechnik), J. Troeim (Norwegian Defence Research Establishment, Kjeller), J. Holtet (Oslo Univ.), K. Maaseide (Oslo Univ.), H. Kopka, and P. Stubbe *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 263-267 refs Sponsored by Bundesministerium fuer Forschung und Technologie and Royal Norwegian Council for Scientific and Industrial Research (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

In-situ ionospheric modifications produced by powerful radio waves transmitted from the ground to a quiet F layer were measured. Spectra of the locally generated plasma waves in the ionosphere were obtained together with information on electron temperature, on suprathermal electrons, and on local electron density, as well as on the fluctuations of all these parameters along the rocket trajectory. The E and H fields of the heating wave, including the polarization of its magnetic field constituent, were determined. Author (ESA)

N83-33442*# Utah State Univ., Logan.
FORMATION OF V-SHAPED POTENTIALS
H. Thiemann (Studien G.m.b.H.), N. Singh, and R. W. Schunk *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 269-275 refs (For primary document see N83-33397 21-46)
(Grants NAGw-77; NSF ATM-80-15497)
Avail: NTIS HC A21/MF A01 CSCL 04A

The V-shaped potential structures formed by the injection of a non-neutral electron current into a cold background plasma were simulated numerically. The injection disturbs the initial quasi-neutral plasma, leading to the excitation of strong turbulences which heat the plasma. This leads to expulsion of the plasma from the simulation region. Due to ambipolar electric fields the current injection is interrupted and the initial background plasma is extracted from the system. A particle composition with the characteristics of the two plasma reservoirs now represents the plasma in the simulation region. The interaction of the electron beam with this plasma excites turbulences of smaller amplitudes. A nearly constant time averaged potential drop with nonstationary distribution develops across the system. Single and multiple double layers may form for the duration of one ion plasma period.
Author (ESA)

N83-33443*# Max-Planck-Institut fuer Aeronomie, Katlenburg-Lindau (West Germany).
FAST MAGNETOSPHERIC ECHOES OF ARTIFICIALLY INJECTED ELECTRONS OBSERVED ABOVE A BRIGHT AURORAL ARC
Klaus Wilhelm and William Bernstein (Rice Univ., Houston) *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 277-284 refs Sponsored by NASA and NRC (For primary document see N83-33397 21-46)
(Grant BMFT-0-OM-030-ZA/WF/WRK-275/3)
Avail: NTIS HC A21/MF A01

Rocket-borne electron beam experiments confirmed earlier observations of fast magnetospheric echoes of artificially injected energetic electrons. A total of 234 echoes were observed at pitch angles from 9 to 10 deg at energies of 1.87 and 3.90 keV. Of these, 102 echoes are unambiguously related to preceding accelerator operations at 2, 4 or 8 keV energy and highest current levels resulting in the determination of transit times of typically 300 to 400 msec. When echoes are present in both energy channels, higher energy electrons lead lower energy ones by 50 to 70 msec. Adiabatic theory applied to the observations yields a reflection height of 3000 to 4000 km. Author (ESA)

N83-33444# EISCAT Scientific Association, Kiruna (Sweden).
THE USE OF THE EISCAT RADAR FACILITY FOR MIDDLE ATMOSPHERE RESEARCH
Juergen Roettger *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 287-294 refs Sponsored by Suomen Akatemia, CNRS, Max-Planck Gesellschaft, Norges Almenvitenskapelige Forskningsraad, Naturvetenskapliga Forskningsraadet and UK Science Research Council (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

The use of the results of radar echoes from the stratosphere and the mesosphere taken with the EISCAT UHF radar system are presented. The operation of EISCAT as a supplementary instrument to rocket soundings during the Middle Atmosphere Physics (MAP) Cold Arctic Mesopause and MAP Winter in Northern Europe high latitude programs is outlined. Author (ESA)

N83-33445# Technische Universitaet, Brunswick (West Germany). Inst. fuer Geophysik und Meteorologie.
GROUND BASED OBSERVATIONS OF AN IMPULSIVELY INCREASED PLASMA FLOW FROM THE TAIL c75
N. Kloecker, H. Luehr, S. Thuerey, and E. Nielsen (Max-Planck Inst. fuer Aeronomie, Katlenburg-Lindau, West Germany) *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 295-298 refs (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

The EISCAT magnetometer chain observed two unusually strong (400,000 A) extremely narrow (20 km) electrojets drifting southward with a velocity of 2 km/sec. Just before these events the magnetometer chain was located on the poleward side of the well developed Harang discontinuity. The events are interpreted as Alfven waves in front of an injected plasma cloud from the tail by which the Harang discontinuity is completely removed.
Author (ESA)

N83-33446# EISCAT Scientific Association, Kiruna (Sweden).
THE POTENTIAL USE OF THE EISCAT AND SONDRESTROMFJORD RADARS IN SUPPORT OF ROCKET AND BALLOON MEASUREMENTS c32
Murray Baron and Juergen Roettger *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 299-306 refs (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

The capabilities of the incoherent scatter radars at EISCAT and Sondrestromfjord are described. Geophysical conditions can be monitored by the radar as an input to the launch decision. Comparisons of the same parameter measured by different instruments increase the confidence level of the results. The radars augment the spatial or temporal coverage of the rocket measurements. The radar measurements supplement those of the rocket or balloon by measuring different, but related parameters. Results from radar/rocket coordinated experiments are shown. The rocket itself is a large radar target, so care must be taken in the experiment design and data analysis to avoid spurious results. Author (ESA)

N83-33447# Max-Planck-Institut fuer Aeronomie, Katlenburg-Lindau (West Germany).
OBSERVATIONS OF AURORAL E-REGION PLASMA IN JOINT ROCKET/SCANDINAVIAN TWIN AURORAL RADAR EXPERIMENT (STARE) c75
E. Nielsen *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 307-310 refs (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

Approaches to relate phase velocities of unstable waves to ionospheric electron drift velocity are outlined, and an experimental investigation of plasma parameters related to two stream instability is proposed. Evidence suggests that plasma waves, excited by the two stream instability in the auroral E region, have phase velocities, which qualitatively agree with theoretical predictions. Power spectral observations with the STARE radars in conjunction with in-situ measurements of the plasma parameters which govern the unstable waves, would allow a detailed quantitative analysis. It could also lead to an improved accuracy of the ionospheric electric field estimates, which can be deduced from the STARE radar measurements. Author (ESA)

N83-33448# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.
ON THE ARC-ASSOCIATED ELECTRIC FIELD PATTERN
G. Marklund *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 311-319 refs Sponsored by Swedish Board of Space Activities (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

Rocket double probe and supplementary observations were used to organize auroral arc types on a physical rather than morphological ground. The classification is based on the relative importance of the polarization electric fields and Birkeland currents. Depending on the dominating mechanism, estimated quantitatively for a number of arc crossings, the arc types are grouped into: polarization arcs, Birkeland current arcs and combination arcs. The high altitude potential distributions corresponding to arc type are presented. Author (ESA)

N83-33449# Space Vector Corp., Northridge, Calif.
A NEW APPROACH TO LAUNCHING ARIES SOUNDING ROCKETS c14
Robert E. Scarboro and Edward F. McKenna (AFGL, Hanscom AFB, Mass.) *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 323-328 (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

The use of an AML 20 K rail launcher for ARIES launches was studied. The AML 20 K can be used if the first 8.5 m section of the launch support rail is removed and holes to support the ARIES base support structure are drilled in the launch rail support plates. Only minor modifications to the ARIES configuration are required. The proposed system can be used in Alaska, the Marshall Islands, Hawaii and Greenland, as well as the original ARIES sites in New Mexico and Sweden. Author (ESA)

N83-33450# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
THE RANGE SAFETY CONCEPT FOR CONESTOGA 1 c14
Gottfried Schneiders and Andy Spencer *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 329-332 (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

For the rocket campaign Conestoga 1, a computer program was installed on a PDP11/23 to produce real time plots of expected impact point, the ground track, and height versus ground range. The program was built with memory resident overlays. The main body of the program consists of a Kalman filter, which is configurable for mission-specific input parameters for the controlled flight phase of a vehicle. The system can be managed by one operator. The input parameter sets for impact prediction can be changed in a few minutes. Author (ESA)

N83-33451# Instituto de Atividades Espaciais, Sao Jose dos Campos (Brazil). Centro Tecnico Aeroespacial.
SONDA 3 OPERATIONAL BRAZILIAN SOUNDING ROCKET c15
J. Boscov and B. M. Furlan *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 333-339 refs (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

A two stage solid propellant sounding rocket, with payload capacity up to 150 kg is presented. Trajectory requirements for investigations of artificial ionospheric irregularities in NE Brazil are discussed. Software, including that used for impact prediction is described. Flight experience confirms software and hardware reliability. Author (ESA)

N83-33452# Queens Univ., Belfast (Northern Ireland). Dept. of Physics.
PHOTOMETRIC OBSERVATIONS OF LOCAL ROCKET-ATMOSPHERE INTERACTIONS
R. G. H. Greer, D. P. Murtagh, G. Witt (Stockholm Univ.), and J. Stegman (Stockholm Univ.) *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 341-347 refs (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

Photometric measurements from rocket flights which recorded a strong foreign luminance in the altitude region between 90 and 130 km are reported. From one Nike-Orion rocket the luminance appeared on both up-leg and down-leg; from a series of Petrel rockets the luminance was apparent only on the down-leg. The data suggest that the luminance may be distributed mainly in the wake region along the rocket trajectory. The luminance is believed to be due to a local interaction between the rocket and the atmosphere although the precise nature of the interaction is unknown. It was measured at wavelengths ranging from 275 nm to 1.61 microns and may be caused by a combination of reactions. Author (ESA)

N83-33453# Space Vector Corp., Northridge, Calif.
COMPUTER BASED ATTITUDE CONTROL SYSTEMS FOR SOUNDING ROCKETS USING TUNED ROTOR GYROS c15
Stewart D. Lyon and Richard O. Rasmussen *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 349-353 refs (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

Attitude and boost control systems using tuned rotor gyros (TRG) as the inertial reference are described. Adoption of the TRG as the inertial reference permits pointing accuracy in the 1/2 to 5 arcmin range, and when integrated with a digital controller, allows almost unlimited reprogrammability of the flight program. A digital attitude control system (ACS) with a microprocessor in the ACS controller and the MIDAS platform and a star tracker as the references was flown. The control algorithm used a current estimator allowing high resolution control from a relatively low resolution reference. A second ACS uses a strapdown TRG set as the inertial reference and a Motorola 6809 microprocessor in the controller. A third system uses the TRGs and a three axes accelerometer set on a roll stable platform and provides the required accuracy for orbital vehicle control and satellite insertion. The digital controller incorporates the Intel 8086/8087 coprocessor. Author (ESA)

N83-33454# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
COORDINATED AURORAL EXPERIMENT USING SCATTER AND ROCKETS (CAESAR): A SOUNDING ROCKET PROJECT TO STUDY THE MAGNETOSPHERE
W. Schrieder and R. Henkel *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 355-358 (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

Two identical payloads to investigate magnetic substorm phenomena, launched by the three stage Skylark 12 sounding rocket, are presented. To avoid sensitivity loss of the magnetic sensors, nonmagnetic materials are used. Stringent requirements are set up by the experiments on electromagnetic shielding. Experiments are boom mounted during their measurement phase; sensors are radially deployed. The 3rd motor stage remains attached to the payload during the measurement phase to avoid an increase of nutation during deployment of the booms. An active attitude control system is therefore not necessary. The launch window is from 24 Jan, to end of March 1984, from the Andoya Rocket Range in Norway. Author (ESA)

N83-33455# Centre National d'Etudes Spatiales, Toulouse (France).
RESULTS OF LONG DURATION BALLOON FLIGHTS c02
Pierre Malaterre *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 359-362 (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

A superpressure stratospheric balloon (BPS) and an infrared montgolfiere balloon (MIR) which carry 50 to 100 kg payloads at

an altitude of 25 to 30 km for several weeks were flight tested. The BPS uses a design named the pumpkin balloon, which allows higher potential life time than the spherical one. The MIR is a very light hot air balloon whose buoyancy is provided by collecting infrared thermal flux coming up from the Earth. An MIR equipped with relief valves could perform up and down altitude variation on request. Flight tests indicate that the MIR can not achieve flight times of several months under all circumstances. The BPS achieves design goals. Author (ESA)

N83-33456# Centre National d'Etudes Spatiales, Toulouse (France).
LONG DURATION FLIGHTS IN EUROPE **c02**
Armand Soubrier *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 363-364 (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

Facilities for trans-Mediterranean balloon flights are described. Nineteen flights of average duration = 20 hr were made by balloons of up to 1 million cu m, carrying payloads of up to 2 tons. Biology, astronomy and atmospheric research experiments were carried. Telecommand and PCM telemetry equipment is available. Author (ESA)

N83-33457# Queens Univ., Belfast (Northern Ireland). Dept. of Pure and Applied Physics.
SOUNDING ROCKET ATTITUDE DETERMINATION FROM ON BOARD MAGNETOMETER AND TELEMETRY SIGNAL POLARISATION DATA **c15**
D. P. Murtagh, R. G. H. Greer, and I. C. McDade *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 365-369 refs Sponsored by Northern Ireland Dept. of Education (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

The attitude of Petrel sounding rockets was determined from on-board magnetometer information and p band telemetry signal strength data from a polarized ground station antenna. Sky background information from the photometric payloads was compared to backgrounds reconstructed from satellite maps to assess the accuracy of the method. The result is consistant with other information available (sky background modulation) within the experimental constraints such as magnetometer calibration and light tables, and does not require extra hardware on the rocket. Accuracy can be improved by machine computation of the phase angles and a closer analysis of the whole flight especially around turnover on reentry. Author (ESA)

N83-33458# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany).
TECHNICAL ASPECTS OF MATERIALS SCIENCE EXPERIMENTS ON SOUNDING ROCKETS **c12**
B. Franke *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 373-378 (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

Preparation for spaceborne materials science experiments by using high altitude sounding rockets is discussed. The TEXUS program is outlined. Each experiment module has its own timer, power supply and data interface, so a high degree of flexibility is achieved during the integration and test phase, good reusability is ensured, and standard systems can be used. The payload is composed of three service modules, including telemetry, recovery system and attitude control system, and the autonomous experiment modules. Payload length is 4.5 m with a lift-off weight of 360 to 370 kg. Microgravity time is 360 sec, at 0.00001 g. The Skylark 7 vehicle is used. Author (ESA)

N83-33459# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany).
THE GERMAN SOUNDING ROCKET PROGRAM TEXUS **c12**
D. Faust *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 379-386 (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

The TEXUS microgravity materials science research program is outlined. Experiments, flown on Skylark 7 rocket vehicles, include investigations of interface phenomena, metals and composites, monocrystals for electronics applications, combustion physics, and biological effects of microgravity. Six furnace modules and eight fluid dynamics modules are available. Payloads are recovered by parachute. Author (ESA)

N83-33460# Swedish Space Corp., Solna.
MATERIALS SCIENCE EXPERIMENTS IN SWEDEN, SOUNDING ROCKETS: GET AWAY SPECIAL (GAS), SPACE SHUTTLE **c12**
R. Joensson, S. Wallin, P. Holm, and E. Soederdahl *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 387-393 refs (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

Equipment for space shuttle reduced gravity materials processing experiments, based on rocket and aircraft parabolic flight experience, is described. Mirror furnaces which process small metal samples with melting temperatures < 1000 C, and gradient furnaces with up to 1250 C capacity were flown on Skylark rockets as part of the TEXUS program. Isothermal, rapid heating mirror, and crystal growth furnaces are presented. The rapid heating furnace was used in an airplane experiment on pore formation in metal foams. Author (ESA)

N83-33461# Tuebingen Univ. (West Germany). Inst. of Astronomy.
HOT PLASMAS IN INTERSTELLAR SPACE **c75**
M. Grewing *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 397-400 refs (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

Observational evidence for hot plasmas in interstellar space is reviewed. A number of phases that differ in both their temperature and density from each other exist. While part of this multiphase structure can be explained qualitatively by a model for the interstellar medium which assumes cool clouds with evaporative interfaces embedded in a tenuous very hot plasma, quantitative comparisons show that the origin of the plasmas and the relation between the different phases is not understood. Author (ESA)

N83-33462# Centre National de la Recherche Scientifique, Verrieres-le-Buisson (France). Lab. de Physique Stellaire et Planetaire.
A HIGH RESOLUTION ULTRAVIOLET SOLAR TELESCOPE-SPECTROGRAPH MOUNTED ON AN EQUATORIAL BALLOON PLATFORM **c74**
D. Samain and P. Lemaire *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 401-407 refs Sponsored by CNES (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

A balloon-borne 30 cm telescope-spectrograph combination was built to observe fine structures of the solar atmosphere with very high spectral and angular resolution in two atmospheric windows: 2700 to 2950 A and 1900 to 2300 A. Solar spectra with spectral resolution of 15 mA and angular resolution of 4 arcsec were recorded. Author (ESA)

N83-33463# Laboratoire d'Astronomie Spatiale, Marseille (France).
A SKY SURVEY AT BALLOON-ULTRAVIOLET WAVELENGTHS **c74**
B. Milliard, M. Laget, J. Donas, J. M. Deharveng, D. Huguenin (Geneva Observatory), and M. Viton *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 409-413 refs Sponsored by CNES and Swiss National Research Foundation (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

A balloon-borne Schmidt-Cassegrain telescope (D = 13 cm, F = 24 cm) devoted to nonsolar astronomy is described. A 6 deg field of view image with an angular resolution of 1.5 arcmin is obtained in the mid ultraviolet atmospheric transmission window. Observations of faint stars and galaxies are reviewed. The design of a second generation telescope (D = 40 cm, F = 100 cm) is outlined. Author (ESA)

N83-33464# Laboratoire d'Astronomie Spatiale, Marseille (France).
THE DESIGN OF A 40 cm BALLOON ULTRAVIOLET TELESCOPE **c74**
M. Saisse, R. Grange, J. L. Boit, and A. Pauget *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 415-419 refs (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

The designs of a three and a two mirror ultraviolet telescope with and without a corrector are discussed. Within the wavelength range around 20 nm, the expected optical image quality (< 10 arcsec) suggests that a cassegrain mounting with a focal corrector is best. The main optical characteristics and performances of the selected design are given. Difficulties in the figuring and the control of the primary parabolic mirror (F/1.45) are mentioned as well as laboratory measurements of the point spread function. The thermal environment, shocks and vibrations induced by the guidance system are identified as the major constraints on the mechanical structure. Author (ESA)

N83-33465# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
INTER ZODIAC: A SOUNDING ROCKET PROJECT FOR HIGH RESOLUTION OF EUV RADIATION
G. Neumann, M. Boison, and R. Henkel *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 421-427 (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

A Skylark rocket-borne helium and hydrogen resonance cell EUV photometer for high resolution spectral analysis of He-I 58.4 nm and H 121.6 nm radiation is described. Measuring cells, gas supply system, and baffle system are accommodated in the top payload section and covered by a split nose cone during ascent. Two of the cells can be connected alternatively to one of the main baffles by a controlled deflecting mirror unit. The combined instruction/attitude control system (ACS) and the pneumatic section are attached to the experiment section. During acquisition of the Sun by the ACS in the ascent, there are measurements in positions near the ecliptic. This is followed in the apogee by a circular scan round the Sun. In the descent there is a similar program. Author (ESA)

N83-33466# World Radiation Center, Davos (Switzerland). Physikalischmeteorologisches Observatorium.
SOLAR RADIOMETRY FROM HIGH ALTITUDE BALLOONS **c92**
R. W. Brusa, C. Froehlich, and Ch. Wehrli *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 429-433 refs (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

A balloon experiment was devised to determine the solar constant and the spectral solar irradiance at selected wavelengths. The solar constant was determined as 1366.2 and 1367.8 W/sqm. Comparisons with other measurements reveal the importance of having both continuous (satellites) and spot measurements in order to assess the short term variability and the long term trends of the solar constant. A time series analysis of the Sun photometer data shows several peaks in the 5 min range. The high coherence with simultanuous measurements from the Solar Maximum Mission satellite indicates the solar origin of the peaks, which are likely to be low degree p-mode oscillations of the Sun. Author (ESA)

N83-33467# Leeds Univ. (England). Dept. of Physics.
OBSERVATIONS OF LARGE SCALE EMISSION IN THE FAR INFRARED
N. C. Birtwell, A. R. Clarke, P. L. Marsden, J. S. Reehal, and C. D. Smith *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 435-443 refs Sponsored by UK Science Research Council (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

A balloon-borne far infrared spectrometer for the investigation of extended sources in the wavelength range 80 to 500 microns was flown in 1980 and 1982 from Texas. During both campaigns periodicities of many minutes were detected in the IR gradients. In 1982 clear evidence for the existence of large scale stratospheric emission exhibiting weak azimuthal gradients, but strong elevational gradients was found. The large angle scanning technique enables the spatial extent and variability of the stratospheric phenomena, which may be linked to the El Chichon, Mexico, volcanic eruption in April 1982 to be investigated. Author (ESA)

N83-33468# Hamburg Univ. (West Germany).
THE FUTURE OF MATERIALS SCIENCE ON SOUNDING ROCKET FLIGHTS **c15**
H. Ahlborn *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 447-448 (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

Research trends in microgravity materials science are traced and the TEXUS sounding rocket program is summarized. The TEXUS program was originally intended as a space shuttle payloads preexperiment project, but its advantages of quick preparation and reduced safety requirements made it a self reliant program. Author (ESA)

N83-33469# Max-Planck-Institut fuer Aeronomie, Katlenburg-Lindau (West Germany).
MAGNETOSPHERIC SOUNDING ROCKET PROGRAM AT HIGH LATITUDES **c15**
K. Wilhelm *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 455-457 (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

The ESA 1976 report 'Sounding Rocket Programmes in the Spacelab Era' is reviewed. Operation in conjunction with Spacelab, support of EISCAT and other ground-based installations, and experimental opportunities afforded by sounding rockets are discussed. Author (ESA)

N83-33470# Bonn Univ. (West Germany). Inst. fuer Astrophysik und Extraterrestrische Forschung.
STATEMENT ON THE FUTURE OF EXPERIMENTAL WORK IN THE FIELD OF SOUNDING ROCKET AND BALLOON RESEARCH: ASTROPHYSICS **c89**
H. J. Fahr *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 459-461 (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

Activities in X-ray, ultraviolet and infrared astronomy using suborbital space vehicles are discussed. The advantages of long observation times on balloon flights for X-ray astronomy are underlined. The use of rockets for space qualification tests of mirrors for satellite-borne ultraviolet astronomy is discussed. Cryogenically cooled infrared astronomy instruments are mentioned. Author (ESA)

N83-33471# Bern Univ. (Switzerland). Inst. fuer Physik.
SILICON CHEMISTRY AND INFERRED WATER VAPOR IN THE LOWER IONOSPHERE
H. Ramseyer, P. Eberhardt, and E. Kopp *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 465-472 refs Sponsored by Swiss National Science Foundation (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

A chemical reaction model for neutral and ionic silicon species was applied to in-situ ion mass spectrometer measurements of five rocket flights. Theoretical profiles of the distribution of Si, Si+, SiO, SiO+, SiO2, SiO+2 and HSiO+, fractional ionization and total silicon densities are obtained. Inferred water vapor mixing ratios from HSiO+ (mass 45) and Si+ (mass 28) measurements in the altitude range between 85 and 120 km are discussed. Results suggest that measured 45+/28+ ratios can be used to infer water vapor densities below 115 km. Above this altitude too high concentrations can result due to outgassing of the rocket and payload, and because ions other than HSiO+ may contribute to mass 45. Author (ESA)

N83-33472# Stockholm Univ. (Sweden). Arrhenius Lab.
OPTICAL ROCKET EXPERIMENTS
G. Witt *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 475-477 (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

European research in high altitude atmospheric physics and chemistry using optical methods is reviewed. The need to improve rocket motors is noted. The decrease in fundamental optical-spectroscopical research is mentioned. The role of international projects such as the Energy Budget Campaign is noted. Author (ESA)

N83-33473# Saint Louis Univ., Mo. Dept. of Earth and Atmospheric Sciences.
ATTENUATION OF SEISMIC WAVES AT REGIONAL DISTANCES Final Technical Report, 1 Oct. 1978 - 30 Sep. 1982
Brian J. Mitchell and Otto W. Nuttli 18 Feb. 1983 78 p refs
(Contract F49620-79-C-0025; ARPA Order 3291; AF Proj. 2309)
(AD-A128396; AFOSR-83-0427TR) Avail: NTIS HC A05/MF A01 CSCL 08/11

This final report deals in part with the use of regional seismic crustal phases, particularly Lg, to discriminate between explosions and earthquakes, to determine mb values of explosions and earthquakes, and to estimate yields at regional distances. An mb-log yield calibration relation is developed for NTS events, and then used to estimate the yields of selected explosions at the Eat Kazakh test sites in the USSR. The report is further concerned with the attenuation of seismic surface waves at intermediate periods and how the attenuation of those waves is related to that of higher-frequency crustal phases. Significant regional variations of upper crustal Q values are found and higher frequency wave propagate more efficiently than expected on the basis of intermediate-period waves. GRA

N83-33474# Sandia Labs., Albuquerque, N. Mex.
UNIAXIAL AND TRIAXIAL COMPRESSION TEST SERIES ON CALICO HILLS TUFF
Ronald H. Price and Adrian K. Jones Oct. 1982 36 p refs
(Contract DE-AC04-76DP-00789)
(DE83-003769; SAND-82-1314) Avail: NTIS HC A03/MF A01

Forty-four uniaxial and triaxial compression experiments were performed on samples of the Tuffaceous beds of Calico Hills obtained from drill hole USW-G1 at Yucca Mountain on the Nevada Test Site. Water saturated and room dry test specimens were deformed at nominal strain rates of 0.001,0.00001, 10 to the minus 7th power, s(1), confining pressures of 0.1, 10 and 20 MPa; and room temperature. Resultant unconfined compressive strengths, axial strains to failure, Young's moduli and Poisson's ratios ranged from 14.2 to 42.0 MPa, 0.0037 to 0.0087, 2.52 to 9.72 GPA and 0.17 to 0.37, respectively. DOE

N83-33475# California Univ., Livermore. Lawrence Livermore Lab. Earth Sciences Dept.
MEASUREMENT OF THERMAL DIFFUSIVITY OF ROCKS AT HIGH PRESSURE
V. V. Mirkovich (Canada Centre for Mineral and Energy Technology), W. B. Durham, and H. C. Heard Oct. 1982 19 p refs Presented at the 8th European Conf. on Thermophysical Properties Conf., Baden-Baden, West Germany, 27 Sep. 1982
(Contract W-7405-eng-48)
(DE83-003879; UCRL-87217; CONF-820985-2) Avail: NTIS HC A02/MF A01

A method for measurement of thermal diffusivity at high hydrostatic pressure was developed by adapting a radial symmetry heat flow method wherein a sinusoidal heat wave is applied to the cylindrical surface of the sample. The accuracy of the measuring system was tested using Pyroceram 9606. Data obtained were within 5% of published values at all temperatures to 400 C and a dependence upon pressure was observed. Thermal diffsivity of three crystalline igneous rock specimens was measured at temperatures from 32 to 400 C and pressures from 0.1 to 200 MPa. The results for Creighton quartz diorite showed only limited temperature and pressure dependence. In the case of Stripa and Westerly granites, this dependence was found to be more substantial. Thermal diffusivity of Strips granite decreased by more than 50% from 32 to 400 C and that of Westerly granite decreased by approximately 40% over the same range. DOE

N83-33476# Los Alamos Scientific Lab., N. Mex.
QUARTZ DISSOLUTION AND SILICA DEPOSITION IN HOT-DRY-ROCK GEOTHERMAL SYSTEMS Thesis
Bruce A. Robinson Jul. 1982 144 p refs
(Contract W-7405-eng-36)
(DE83-004997; LA-9404-T) Avail: NTIS HC A07/MF A01

The kinetics of quartz dissolution control the produced fluid dissolved silica concentration in geothermal systems in which the downhole residence time is finite. The produced fluid of the Phase I, Run Segment 5 experimental Hot Dry Rock (HDR) geothermal system at Fenton Hill, NM, was undersaturated with respect to quartz in one pass through the reservoir; suggesting that the rate of granite dissolution governed the outlet dissolved silica concentration in this system. The literature data for the rate of quartz dissolution in water from 65 to 625 C is correlated using an empirical rate law which is first order in quartz surface area and degree of undersaturation of the fluid. The Arrhenius plot (in k vs T minus) is linear over eight orders of magnitude of the rate constant, verifying the validity of the proposed rate expression. Carefully performed quartz dissolution experiments duplicated the literature data and completed the data base in the temperature range from 150 to 250 C. DOE

N83-33477# Sandia Labs., Albuquerque, N. Mex.
LATERAL VARIABILITY IN THE CORCORAN AND COZZETTE BLANKET SANDSTONE AND ASSOCIATED MESAVERDE ROCKS, PICEANCE CREEK BASIN, NORTHWESTERN COLORADO
J. C. Lorenz 1983 10 p refs Presented at SPE Symp. on Low Permeability, Denver, 14 Mar. 1983
(Contract DE-AC04-76DP-00789)
(DE83-006299; SAND-82-2351C; CONF-830305-2;
SPE-Paper-11608) Avail: NTIS HC A02/MF A01

The widespread sandstone members of the Lower Mesaverde Group (the Iles Formation) in the Piceance Creek basin have significant laterial variability within an overall blanket morphology. This variability is seen in the Corcoran and Cozzette Sandstone members in the closely-spaced Multi-Well Experiment (MWX) wells, and is interpreted from nearby outcrops along the Grand Hogback. Much of the lateral variability consists of thickness changes of both the sandstones and the interbedded lithologies. The locations of the thickest blanket deposits (the best potential reservoirs) may be a function of the locations of principal distributary systems. For the delta plain deposits, the main source of natural gas is the interbedded coals which should be thickest where distributaries were least abundant. DOE

N83-33478# Geological Survey, Menlo Park, Calif.
PRINCIPAL FACTS OF GRAVITY STATIONS WITH GRAVITY AND MAGNETIC PROFILES FROM THE SOUTHWEST NEVADA TEST SITE, NYE COUNTY, NEVADA, AS OF JANUARY 1982
P. E. Jansma, D. B. Snyder, and D. A. Ponce Menlo Park, Calif. 1983 69 p refs
(Contract DE-AI08-78ET-44802)

(DE83-010300; USGS-OFR-82-1041) Avail: NTIS HC A04/MF A01

Three gravity profiles and principal facts of 2604 gravity stations in the southwest quadrant of the Nevada Test Site are documented. The residual gravity profiles show the gravity measurements and the smoothed curves derived from these points that were used in geophysical interpretations. The principal facts include station label, latitude, longitude, elevation, observed gravity value, and terrain correction for each station as well as the derived complete Bouguer and isostatic anomalies, reduced at 2.67 g/cm(3). DOE

N83-33479# Los Alamos Scientific Lab., N. Mex.
COMPUTER MODEL OF CHEMISTRY AND DYNAMICS OF THE MESOSPHERE, THERMOSPHERE, AND IONOSPHERE
C. D. Sutherland and J. Zinn Jan. 1983 49 p refs
(Contract W-7405-eng-36)
(DE83-008358; LA-9636-MS) Avail: NTIS HC A03/MF A01

A computer model of the mesosphere, thermosphere, and ionosphere is described. Computed results are compared with experimental data on the diurnal variations of that system under normal ambient and magnetically disturbed conditions. The model includes the effects of time varying thermospheric winds and F fields, electron, ion and neutral temperatures, solar and geomagnetic activity, eddy diffusion, and molecular diffusion. The computer model is designed to be two dimensional for application to problems of F layer depletions due to rocket exhaust products. One dimensional results are described and data on the natural ionosphere at the time of the Skylab I launch in May 1973 are compared. DOE

N83-33480# Argonne National Lab., Ill. Atmospheric Physics Section.
ROLE OF THE FLUX DIVERGENCE TERMS IN THE TURBULENT ENERGY EQUATION
Paul Frenzen 1983 5 p refs Presented at the 6th Am. Meteorol. Soc. Symp. on Turbulence and Diffusion, Boston, 22 Mar. 1983
(Contract W-31-109-eng-38)
(DE83-009597; CONF-830307-15) Avail: NTIS HC A02/MF A01

The energy budget of the surface boundary layer, the pressure transport team, was summarized by Wyngaard and Cote, 1971 (W and C) in a set of curves that depict the stability dependent behavior of the sevral budget components in the surface layer. The curves represent a standard of comparison against which many subsequent experimentalists try their data. Implications of the W and C curves are reconsidered from point of view that emphasizes the role of the flux divergence terms. The results define stability ranges over which certain simplified energy budget relations may be considered valid, and suggest empirical factors which can be included to improve their accuracy. This modified presentation of the W and C relations for the budget components also magnifies a paradoxical behavior of the flux divergence terms in near neutral conditions, a behavior which conceivably could be an artifact introduced by the neglect of nonzero flux divergence at neutrality. DOE

N83-33481# California Univ., Berkeley. Lawrence Berkeley Lab. Earth Sciences Div.
INVESTIGATION OF THE CONDUCTIVITY DISTRIBUTION IN THE VICINITY OF A CASCADE VOLCANO Ph.D. Thesis
Edward Clarence Mozley Nov. 1982 394 p refs
(DE83-012478; LBL-15671) Avail: NTIS HC A17/MF A01

Magnetotelluric and telluric data were acquired in the vicinity of Mount Hood Oregon as part of a multidiscriplinary exploration program to evaluate the geothermal potential of this stratocone volcano. Eleven field components were acquired simultaneously over the frequency band of 50. to .001 hertz. These data consisted of one five component magnetotelluric base site, two sets of two component remote electric field measurments and one set of remote horizontal magnetic field measurements. The data were recorded digitally in the field and processed later using the remote electric and magnetic signals to obtain unbiased tensor impedance and geomagnetic transfer function (tipper) estimates. DOE

N83-33482# Centre National de la Recherche Scientifique, Orleans (France). Laboratoire de Physique et Chimie de l'Environnement.
WAVE DISTRIBUTION FUNCTIONS FOR PLASMASPHERIC HISS OBSERVED ON BOARD ISEE-1
F. Lefeuvre, M. Parrot, L. R. O. Storey, and R. R. Anderson (Iowa Univ., Iowa City) Mar. 1983 28 p refs
(LPCE-NT-6) Avail: NTIS HC A03/MF A01

Plasmaspheric hiss observed on the ISEE-1 satellite, near the magnetic equator, is analyzed in terms of the wave distribution function. Most of the wave energy is conveyed by waves with their normals inclined to the Earth's magnetic field at very large angles, clearly related to the Gendrin angle. Particularly in or near a region identified as the source, the wave normals are concentrated into two packets that are almost opposite in azimuth. The packets tend to converge towards the local magnetic meridian plane as the satellite moves away from the source region. Author (ESA)

N83-33483# Research Inst. of National Defence, Stockholm (Sweden).
SEISMOLOGY 1982. NUCLEAR TEST BAN VERIFICATION EARTHQUAKE AND EARTH RESOURCE INVESTIGATION Progress Report, 1982
Harriet Ohlsson May 1983 87 p refs
(FOA-C-20492-T1) Avail: NTIS HC A05/MF A01

Seismological projects are reported, including nuclear explosion monitoring, the development of international data centers, seismic risk estimation for nuclear power plants, oil exploration using seismic methods, and crystalline rock investigation using seismic cross hole measurements. The Swedish seismic network is described. In 1982 France conducted 5 nuclear tests, Britain 1, the US 18, and the USSR 31. The explosions were underground and within the 150 kton limit. Author (ESA)

N83-33239# Academy of Sciences (USSR), Moscow.
ON CLASSIFICATION OF MONITORING AND ON A PLACE IN IT OF GEOSYSTEM MONITORING
V. D. Utekhin *In its* Geosystem Studies for Monitoring 1981 p 8-14 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

N83-33240# Academy of Sciences (USSR), Moscow.
CLASSIFICATION OF DEVELOPING SYSTEMS AS PREMISE FOR WORKING OUT OF ADEQUATE MATHEMATICAL MODELS OF GEOSYSTEMS
V. E. Obuchov *In its* Geosystem Studies for Monitoring 1981 p 15-20 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

N83-33242# Academy of Sciences (USSR), Moscow.
SYSTEM APPROACH TO GEOSYSTEM MONITORING
N. I. Rudnev *In its* Geosystem Studies for Monitoring 1981 p 27-39 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

N83-33243# Academy of Sciences (USSR), Moscow.
RESEARCHES OF GEOSYSTEM FUNCTIONAL STRUCTURE AND ITS AUTHROPOGENOUS TRANSFORMATION AT THE KURSK FIELD EXPERIMENTAL BASE AS A BASE FOR DEVELOPING OF GEOSYSTEMS MONITORING
A. M. Green and V. D. Utekhin *In its* Geosystem Studies for Monitoring 1981 p 39-45 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

N83-33275# Nagoya Univ. (Japan).
A METHOD OF ANALYSIS IN THE SOLAR OCCULTATION MEASUREMENTS
Masumi Takagi and Yutaka Kondo *In* Nagoya Univ. Proc. of the Res. Inst. of Atmospherics, Nagoya Univ., Vol. 30 Mar. 1983

p 1-14 refs (For primary document see N83-33274 21-42)
Avail: NTIS HC A06/MF A01

N83-33488# Meteorological Satellite Center, Tokyo (Japan).
IONOSPHERIC SCINTILLATION WHICH DISTURBED THE GMS-2 COMMUNICATION LINK
Shinya Ueda, Masatoshi Matuo, Masashi Sato, Yasukiyo Momoi, Tsutoya Abe, Kazuo Ide, and Kaoru Tachibana *In its* Meteorol. Satellite Center Tech. Note, No. 7, 1983 Mar. 1983 p 29-46 refs In JAPANESE; ENGLISH summary (For primary document see N83-33485 21-47)
Avail: NTIS HC A06/MF A01

N83-33277# Nagoya Univ. (Japan).
A LASER RADAR SYSTEM FOR THE OBSERVATION OF MINOR ATMOSPHERIC CONSTITUENTS IN THE STRATOSPHERE
Akira Iwata, Yutaka Kondo, and Masumi Takagi *In* Nagoya Univ. Proc. of the Res. Inst. of Atmospherics, Nagoya Univ., Vol. 30 Mar. 1983 p 25-35 refs (For primary document see N83-33274 21-42)
Avail: NTIS HC A06/MF A01

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N83-33484# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
TELECONNECTIONS BETWEEN SOUTH AMERICA AND WESTERN AFRICA AS REVEALED BY MONTHLY PRECIPITATION ANALYSES
Antonio Divino Moura and Mary T. Kagano May 1983 5 p refs Presented at the 1st Intern. Conf. on Southern Hemisphere Meteorol., Sao Jose dos Campos, Brazil, 31 Jul. - 6 Aug. 1983 (INPE-2734-PRE/315) Avail: NTIS HC A02/MF A01

The spatial distribution of monthly precipitation deviations from the normal over tropical South America and Western Africa was investigated using the available data up to the seventies. The spatial scales associated with these deviations were determined for dry and wet years in Norhteast Brazil. It was found that, on the average, the NE Brazil drought spatial scale is not confined to that region but extends from South America to Africa, and perhaps more to East, in accordance with GCM simulations by Moura and Shukla (1981). The results also show an inverse relationship between NE Brazil and Guyanas rainfall, in agreement with Hastenrath and Heller (1977). It was found that years of drought in NE Brazil are also extremely dry over the south equatorial region of Africa, west of 20 deg E. In addition, time series of seal level wind divergence for March in the Atlantic, from 1948 up to 1972, correlated with precipitation in NE Brazil (Fortaleza and Quixeramobim) shows a negative area of correlation in South Atlantic and a positive area in tropical North Atlantic. Author

N83-33485# Meteorological Satellite Center, Tokyo (Japan).
METEOROLOGICAL SATELLITE CENTER TECHNICAL NOTE, NO. 7, 1983
Mar. 1983 117 p refs In JAPANESE; ENGLISH summaries (ISSN-0388-9653) Avail: NTIS HC A06/MF A01

Contributions from the Meteorological Satellite Center in Tokyo, Japan are presented. Observations made as well as new techniques for data acquisition and processing are discussed in 11 technical papers. For individual titles, see N83-33486 through N83-33493. L.F.M.

N83-33486# Meteorological Satellite Center, Tokyo (Japan).
FEATURES OF SATELLITE OBSERVED CLOUD-TOP TEMPERATURE CONTOUR PATTERN OF CONVECTIVE CLOUD CLUSTERS WITH HEAVY RAINFALL IN BAIU-SEASON, CASE STUDY
Hiroyuki Koba *In its* Meteorol. Satellite Center Tech. Note, No. 7, 1983 Mar. 1983 p 1-12 refs In JAPANESE; ENGLISH summary (For primary document see N83-33485 21-47)
Avail: NTIS HC A06/MF A01

Evolution of convective cloud clusters and accompanied heavy rainfall characteristics were studied using the contour map of satellite observed equivalent black-body cloud-top temperature (T sub BB, averaged over 0.1 lat. x 0.1 long. area) observed every 30 minutes and rainfall data from dense AMeDAS automatically reporting station network, in the case of a heavy rainstorm in Kyushu on 27-28 June 1979. Heavy rainfall (more than 10 mm/30 min.) was mostly found in correspondent to minimum T sub BB core (T sub BB lower than -60 C, its closed contour diameter 40 km). Correspondence between the heavy rainfall and minimum T sub BB core was mostly good during the core developing stage (the period when the core temperature was decreasing), but in the mature or decaying stage of the core the correspondence was poor. Also this correspondence was less obvious in the area where orographic enhancement of rain was expected. An empirical relation was derived between the minimum temperature T sub BB of the cores and expected 30 minutes rainfall amount R30(mm) associated with their passage: R(3)=0. 015 T sub BB squared 2 + 0.753 T sub BB + 11, whenever T sub BB is -70 C less than T sub BB less than -20 C. Author

N83-33487# Meteorological Satellite Center, Tokyo (Japan).
GMS-2 OBSERVATION OF VOLCANIC ASHES FROM MEXICAN VOLCANO EL CHICHON
Hisayuki Funada and Kiyoshi Arai *In its* Meteorol. Satellite Center Tech. Note, No. 7, 1983 Mar. 1983 p 13-27 In JAPANESE; ENGLISH summary (For primary document see N83-33485 21-47)
Avail: NTIS HC A06/MF A01

On the visible picture of 0600 JST April 6, 1982 some things were found over the Hawaiian Islands. They obscured the cloud and the sea hazily. We inferred them to be the volcanic ashes from Mt. El Chichon, and studied how they were transferred using the visible pictures taken during daylight hours. The volcanic ashes over the Hawaiian Islands April 6 drifted to the west, then reached over the sea south of Japan (140 deg E) April 13. Besides this, other ashes were recognized over India and Bay of Bengal on the picture of 1800 JST April 13. These ashes were progressing opposite in the direction, that is, to the east, which would suggest that they were on a level different from that. On April 16 the ashes moving eastward extended to the Philippine Islands, and overlapped with the ashes which had been carried from the east, the Hawaiian Islands. These ashes floating on the different levels were as if they were flowing within a tube imbedded in the region between 10 deg N and 25 deg N whose width was 5 - 10 deg in latitude. From April 23 to April 26 they persisted over the tropical regions of Pacific Ocean although they were partially invisible. Finally by the middle of June, it has been difficult to detect the volcanic ashes by visual inspection of pictures. The changes of albedo associated with the phenomena mentioned above was also investigated. Author

N83-33488# Meteorological Satellite Center, Tokyo (Japan).
IONOSPHERIC SCINTILLATION WHICH DISTURBED THE GMS-2 COMMUNICATION LINK c46
Shinya Ueda, Masatoshi Matuo, Masashi Sato, Yasukiyo Momoi, Tsutoya Abe, Kazuo Ide, and Kaoru Tachibana *In its* Meteorol. Satellite Center Tech. Note, No. 7, 1983 Mar. 1983 p 29-46 refs In JAPANESE; ENGLISH summary (For primary document see N83-33485 21-47)
Avail: NTIS HC A06/MF A01

Large scale and severe ionospheric scintillation occurred in the GMS-2 communication links from 13:30 to 23:00z(UT), Sep, 6th, 1982. The fluctuation of the receiving level at the CDAS reached maximum of more han 25dB and the GMS-2 operation was considerably disturbed such as missing of many data lines in the 21z VISSR image and interruption of ranging operation. A review of the trouble records on each communication link with discussion of the relation between ionospheric scintillation, solar activity and geomagnetic activity are presented. Author

N83-33489# Meteorological Satellite Center, Tokyo (Japan).
THE ISOTHERMAL PATTERN MAPPING OF THE GMS VISSR

INFRARED IMAGERY AND ITS APPLICATION TO A HEAVY RAINSTORM

Takao Matsunaga *In its* Meteorol. Satellite Center Tech. Note, No. 7, 1983 Mar. 1983 p 39-46 In JAPANESE; ENGLISH summary (For primary document see N83-33485 21-47)

Avail: NTIS HC A06/MF A01

Spatial distribution of Geostationary Meteorological Satellite infrared radiometer data offers valuable information for meteorological analysis. A computer program was devised for easier and quicker drawing of the satellite observed equivalent black body temperature (T sub BB) contour patterns. As an example of its application, features of T sub BB contour patterns were studied in a case of heavy rainstorm occurring in Kyushu on 23 July 1982. The most intense rainfall was frequently found in the areas where the T sub BB gradients were largest and on the up-to upper tropospheric wind side of the lowest T sub BB area, not in the midst of the lowest T sub BB areas. Author

N83-33490# Japan Metecrological Agency, Tokyo.

THE MODIFICATION OF THE OPERATIONAL PROGRAM FOR GMS-2 **c15**

Junichi Nose, Yasukiyo Momoi, Takehisa Sakai (Science and Technology Agency), and Koichi Kimura *In* Meteorological Satellite Center Meteorol. Satellite Center Tech. Note, No. 7, 1983 Mar. 1983 p 47-52 In JAPANESE; ENGLISH summary (For primary document see N83-33485 21-47)

Avail: NTIS HC A06/MF A01

GMS-2 was launched in August 1981, and has been operational in December that year in place of GMS. In 1979 we started the necessary modifications in the hardwares and softwares in Meteorological Satellite Center in preparation for above satellite change. This report describes briefly the modification made on the operational program of computers in Meteorological Satellite Center, especially telemetry and command processing. Author

N83-33491# Meteorological Satellite Center, Tokyo (Japan).

ON THE MODIFICATION OF COMPUTER PROGRAMS FOR THE IMPROVEMENT OF LOW RESOLUTION FACSIMILE DISSEMINATION **c32**

Hiroshi Fujimura *In its* Meteorol. Satellite Center Tech. Note, No. 7, 1983 Mar. 1983 p 59-72 In JAPANESE; ENGLISH summary (For primary document see N83-33485 21-47)

Avail: NTIS HC A06/MF A01

As Low Resolution Facsimile dissemination, usually, the eight divided pictures of infrared channel were transmitted. The programs for LR-FAX products were modified and supplemented the following facilities in this time. Drawing up various kind of enhancement pictures. Drawing up magnified picture to quadruple of the divided pictures. Supplementing the annotation signal to II pictures for auto-receipt on SDUS by digitizing the FAX signal. Output of visible picture. As a result of the modification, total of nine pictures added either the visible picture (in the daytime) or the infrared enhancement picture (in the night) covering Japan sector are transmitted every three hours and the annotation signal is supplemented the head of all pictures from 20 July, 1982. Author

N83-33492# Meteorological Satellite Center, Tokyo (Japan).

DEVELOPMENT OF COMPUTER PROGRAMS FOR VISSR CALIBRATION DATA ARCHIVING AND EDITING **c61**

Masami Tokuno and Tatekatu Yoshida *In its* Meteorol. Satellite Center Tech. Note., No. 7, 1983 Mar. 1983 p 73-78 refs In JAPANESE; ENGLISH summary (For primary document see N83-33485 21-47)

Avail: NTIS HC A06/MF A01

Since the characteristics of visible and infrared brightness levels of VISSR are affected by the temperature in the bus of VISSR, debasement of the sensor and electronics circuits and so on, it is necessary to carry out the calibration processing repeatedly for normalizing and correcting to maintain the constant quality of VISSR image data. This calibration processing is carried out once a day in MSC Computer System. In order to evaluate and analyze the calibration data, it is useful to produce the accumulated calibration data set on magnetic tape for long period. The computer programs to produce this data set were developed. The computer programs have the following functions; (1) accumulating the calibration data arranged by time-sequence on MT, (2) extraction and edition of arbitrary calibration data from the accumulated data set and print out the results on line printer. As these data sets are produced routinely on the computer compatible tape in MSC, it would be able to use for data archiving of calibration data. Author

N83-33493# Meteorological Satellite Center, Tokyo (Japan).

ON THE OPTIMAL TIME-INTERVAL OF SATELLITE IMAGE ACQUISITION FOR OPERATIONAL CLOUD MOTION WIND DERIVATION

Tadaaki Hamada *In its* Meteorol. Satellite Center Tech. Note, No. 7, 1983 Mar. 1983 p 79-88 refs In JAPANESE; ENGLISH summary (For primary document see N83-33485 21-47)

Avail: NTIS HC A06/MF A01

Several articles, in which the experiments of target cloud tracking for deriving cloud motion wind using several pairs of time-sequential images taken at different intervals are described and reviewed for the purpose of getting the information on the optimal time interval of ingesting images for tracking. The reviewed results are briefly summarized in the following outline: (1) in view of image granularity, the longer time interval of ingesting images is desirable than shorter one, and (2) in view of life-time and deformation of the target cloud, the shorter time interval of ingesting images is desirable than longer one. Author proposes that the optimal time interval of ingesting images is 15 minutes, on the basis of the review as mentioned above and further discussion. Following benefits are expected from the wind derivation using images taken at 15 minutes interval instead of 30 minute interval: (1) cirrus clouds moving with rather high speed can be accurately tracked; and (2) the total number of resultant satellite winds can be increased for both high-level and low-level. Author

N83-33494*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

NASA/MSFC FY-83 ATMOSPHERIC PROCESSES RESEARCH REVIEW

Robert E. Turner, comp. Aug. 1983 163 p Program review held at Huntsville, Ala., 24-25 May 1983

(NASA-CP-2281; M-417; NAS 1.55:2281) Avail: NTIS HC A08/MF A01 CSCL 04B

The atmospheric processes research program was reviewed. Research tasks sponsored by the NASA Office of Space Science and Applications, Earth Sciences and Applications Division in the areas of upper atmosphere, global weather, and mesoscale processes are discussed. The are: the research project summaries, together with the agenda and other information about the meeting. E.A.K.

N83-33495# World Meteorological Organization, Geneva (Switzerland).

THE RESULTS OF THE GLOBAL WEATHER EXPERIMENT

1983 136 p refs Lectures presented at 34th WMO Executive Comm., Geneva, 1982

(WMO-610; ISBN-92-63-10610-X) Avail: NTIS MF A01; print copy available at WMO, Geneva

Results of synoptic observations in the tropics and in the Northern Hemisphere stratosphere are presented. The impact of the Global Weather Experiment in the Southern Hemisphere is assessed. For individual titles, see N83-33496 through N83-33497.

N83-33496# European Centre for Medium-Range Weather Forecasts, Reading (England).

RESULTS OF THE GLOBAL WEATHER EXPERIMENT

Lennart Bengtsson *In* WMO The Results of the Global Weather Expt. 1983 p 1-40 refs (For primary document see N83-33495 21-47)

Avail: NTIS MF A01; print copy available at WMO, Geneva

Synoptic phenomena from the tropics where FGGE observations substantially improve possibilities of surveying the atmosphere are presented. The mean atmospheric circulation during

January and July 1979 is summarized. Results of experiments where different observing systems were evaluated and their impact on numerical weather prediction was assessed are presented. Results of prediction experiments that show a considerable improvement in forecasting skill, with examples from the tropics and from the Northern Hemisphere stratosphere are given.
Author (ESA)

N83-33497# Bureau of Meteorology, Melbourne (Australia).
THE IMPACT OF THE GLOBAL WEATHER EXPERIMENT IN THE SOUTHERN HEMISPHERE
J. W. Zillman *In* WMO The Results of the Global Weather Expt. 1983 p 41-134 refs (For primary document see N83-33495 21-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

The impact of the Global Weather Experiment in the Southern Hemisphere 2 1/2 yr after the completion of its observational phase is assessed. The experiment had a major positive impact on routine meteorological operations during the observational year, but the impact is poorly documented. With the FGGE-type data base and sophisticated models, essentially automated broadscale analysis in the Southern Hemisphere appears operationally feasible and useful levels of prediction skill out to about a week are achieveable. Drifting buoys, automated aircraft winds and satellite temperature sounding, along with satellite cloud imagery and cloud-track winds, emerge as essential components of a future composite Southern Hemisphere observing system. Author (ESA)

N83-33498# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO), PARTS A-F, FORT BENNING, GEORGIA Final Report
Sep. 1982 400 p
(AD-A128114; AD-E850363; USAFETAC/DS-82/064) Avail: NTIS HC A17/MF A01 CSCL 04/2

This report is a six part statistical summary of surface weather observations for Fort Benning, Georgia. It contains the following parts: (1) Weather conditions; Atmospheric phenomena; (2) Precipitation, Snowfall and Snow Depth (daily amounts and extreme values); (3) Surfaces winds; (4) Ceiling versus visibility; Sky Cover; (5) Psychrometric Summaries (daily maximum and minimum temperatures, extreme maximum and minimum temperatures, psychrometric summary of wet-bulb temperature depression versus dry-bulb temperature, means and standard deviations of dry-bulb, wet bulb and dew point temperatures and relative humidity); and (F) Pressure Summary (means, standard, deviations, and observation counts of station pressure and sea-level pressure). Data in this report are presented in tabular form, in most cases in percentage frequency of occurrence or cumulative percentage frequency of occurring tables. GRA

N83-33499# California Univ., Livermore. Lawrence Livermore Lab.
ARAC TESTING FOR POTENTIAL NUCLEAR REGULATORY COMMISSION METEOROLOGICAL STAFF USE
L. C. Rosen Sep. 1982 40 p refs
(Contract W-7405-eng-48)
(DE83-000361; NUREG/CR-2779) Avail: NTIS HC A03/MF A01

A project to examine and assess the potential of the Atmospheric Release Advisory Capability (ARAC) for contributing to the emergency response capabilities of the Nuclear Regulatory Commission (NRC) staff is discussed. Preliminary planning, installation, and testing of the ARAC site facility at the NRC Incident Response Center are summarized. ARAC participation in two days of field testing at Idaho Falls, Idaho, in July 1981 is examined. The ARAC system is evaluated, with emphasis on communications, meteorology, the suite of models contained within the ARAC system, and the staff. The implications of this project in designing the next-generation ARAC system to service federal and state needs are assessed. DOE

N83-33500# Brookhaven National Lab., Upton, N. Y.
DATA-ACQUISITION SYSTEM FOR ENVIRONMENTAL MONITORING ABOARD A TWIN-ENGINED AIRCRAFT
J. Tichler, H. Bernstein, R. M. Brown, and P. Daum 1983 5 p refs Presented at the 5th Symp. on Meteorol. Observations and Instrumentation, Toronto, 11 Apr. 1983
(Contract DE-AC02-76CH-00016)
(DE83-005793; BNL-32339; CONF-830412-1) Avail: NTIS HC A02/MF A01

Experimental platforms which were used in support of the multistate atmospheric power production study (MAP3S) and the coastal meteorology programs are discussed. These platforms include a twin engine aircraft, a motorized van, a variety of boats and temporary enclosures set up in the field. Each platform carried a data logger consisting of a multiplexer, an analog to digital (A/D) converter and a four track endless loop magnetic tape for data storage. It has become increasingly evident that the data loggers in use were no longer adequate. Since the aircraft provided the most constraints on the data acquisition system and is the most important research platform, a data system was designed for that platform with the secondary goal that the system would serve as a prototype for systems to be used on other platforms.
DOE

N83-33501# Pacific Northwest Lab., Richland, Wash.
OBSERVATIONS OF DRAINAGE WINDS ON A SIMPLE SLOPE
J. C. Doran and T. W. Horst Nov. 1982 4 p refs Presented at the 6th Am. Meteorol. Soc. Symp. on Turbulence and Diffusion, Boston, 22-25 Mar. 1983
(Contract DE-AC06-76RL-01830)
(DE83-007851; PNL-SA-10634; CONF-830307-12) Avail: NTIS HC A02/MF A01

Katabatic winds observed over a simple slope which showed progressive deepening and strengthening with increased downslope distance are discussed. The maximum in the downslope wind component increases, and the height of the maximum rises as the flow develops. A measure of the flow depths obtained from the temperature profiles shows that these depths are insensitive to the details of the ambient conditions, provided the drainage flows are well established. It is found that depths of the katabatically driven winds are more sensitive to ambient wind directions. DOE

N83-33502# Sandia Labs., Albuquerque, N. Mex.
ROTATIONALLY-SAMPLED FLOW-FIELD MEASUREMENTS FOR VERTICAL-AXIS WIND TURBINES
R. E. Akins 1983 6 p refs Presented at Wind/Solar Energy Conf., Kansas City, Mo., 25 Apr. 1983
(Contract DE-AC04-76DP-00789)
(DE83-009550; SAND-82-2341C; CONF-830432-2) Avail: NTIS HC A02/MF A01

The effects a wind-turbine blade moving through a turbulent flow field have on the frequency content of the relative velocity seen by the blade are an important aspect of the aerodynamically induced loads and may also contribute to the fatigue loads. Emphasis was placed on these effects in large horizontal-axis turbines. Measurements of a rotationally-sampled flow field using the DOE/Sandia 17-m research turbine were completed. These measurements show increased energy content at integer multiples of rotation rate and indicate why rotational sampling may be an important concept in rotor design. These measurements are the first conducted on an operational turbine in a field environment.
DOE

N83-33503# Graz Univ. (Austria). Inst. fuer Nachrichtentechnik und Wellenausbreitung.
ELECTRONIC MEASUREMENT OF RELATIVE HUMIDITY AND BAROMETRIC PRESSURE [ELEKTRONISCHE MESSUNG DER RELATIVEN LUFTFEUCHTE UND DES BAROMETRISCHEN LUFTDRUCKS]
W. Ziegler and D. Kirchner Dec. 1982 141 p refs In GERMAN; ENGLISH summary
(INW-8206) Avail: NTIS HC A07/MF A01

Measuring instruments for relative humidity and for barometric pressure were developed. Relative humidity is measured by three different sensors, suitable for outdoor only or for indoor opera-

tion. The measuring instrument has matched input amplifiers. The data are shown on a digital display. A digital magnitude comparator compares the data to two adjustable limiting values (maximum, minimum). The data can also be read directly by a computer. The pressure measuring instrument is built analogically to the humidity measuring instrument. It has two inputs and two recording outputs, which show the data in a specific range. Author (ESA)

N83-33504# World Meteorological Organization, Geneva (Switzerland).
[ACTIVITIES REPORT IN METEOROLOGY] Annual Report, 1982
1983 214 p refs
(WMO-609; ISBN-92-63-10609-6) Avail: NTIS MF A01; print copy available at WMO, Geneva

Activities in the following program areas are described: World Weather Watch; research and development; meteorological applications and environment; hydrology and water resources development; technical cooperation; and education and training. Other technical and supporting activities are outlined, including administrative and legal matters. Author (ESA)

N83-33505# World Meteorological Organization, Geneva (Switzerland).
REPORT OF THE FOURTH SESSION OF THE WEST AFRICAN MONSOON (WAMEX) SCIENTIFIC AND MANAGEMENT REGIONAL COMMITTEE Global Atmospheric Research Programme
1983 106 p refs In ENGLISH and FRENCH Conf. held at Cairo, 29 Nov.-2 Dec. 1982 Sponsored in cooperation with ICSU, Rome
(GARP-Spec-Rept-41) Avail: NTIS MF A01; print copy available at WMO, Geneva

The status of data management activities at WAMEX data centers in Dakar, Oran and Lagos was discussed. All data management activities were finished by the end of 1982, and complete data sets are available. Reports of WAMEX related committees (FGGE, research planning, numerical experimentation, administrative) are appended. Author (ESA)

N83-33506# Illinois State Water Survey, Champaign.
EFFECT OF CONTRAIL CIRRUS ON SURFACE WEATHER CONDITIONS IN THE MIDWEST, PHASE 2 Final Report
Wayne M. Wendland and Richard G. Semonin Sep. 1982 100 p refs
(Grant NSF ATM-80-08812)
(PB83-190967; ISWS/CON-298/82) Avail: NTIS HC A05/MF A01 CSCL 04B

The second phase of a study of the effect of aircraft contrails on surface climate in the Upper midwest had four objectives: to determine the frequency and areal extent of contrail cirrus and their effect on surface temperature, insolation, and other climatic parameters; to estimate the effect of contrail cirrus on past observations of cloud cover; to delineate typical areas of persistent contrails on a daily basis in order to estimate the total areal depletion of solar radiation due to contrail cirrus; and to determine temperature and insolation changes due to partial interception of sunlight by individual contrails. Analyses were made first order stations cloud cover observations, and Champaign, Illinois, insolation and temperature records. GRA

N83-33249# Academy of Sciences (USSR), Moscow.
ROLE OF THE WIND IN REDISTRIBUTION OF RAIN PRECIPITATION IN FOREST
L. V. Medvedev *In its* Geosystem Studies for Monitoring 1981 p 90-101 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

N83-33250# Academy of Sciences (USSR), Moscow.
RAIN INTERCEPTION BY VEGETATION IN CEREAL CROPS
V. A. Tjulenjeva *In its* Geosystem Studies for Monitoring 1981 p 101-106 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

N83-33263# Meteorological Satellite Center, Tokyo (Japan).
OUTLINE OF THE TOVS DATA PROCESSING SYSTEM
Tadao Aoki *In its* Sum. of TOVS Data Process. System Mar. 1983 p 1-10 refs In JAPANESE; ENGLISH summary (For primary document see N83-33262 21-42)
Avail: NTIS HC A08/MF A01

N83-33267# Meteorological Satellite Center, Tokyo (Japan).
DETERMINATION OF THE LOCATION AND PARTIAL CLOUD AMOUNT IN EACH HIRS SPOT
Tadao Aoki and Shinobu Nakajima *In its* Sum. of TOVS Data Process. System Mar. 1983 p 57-66 refs In JAPANESE; ENGLISH summary (For primary document see N83-33262 21-42)
Avail: NTIS HC A08/MF A01

N83-33268# Meteorological Satellite Center, Tokyo (Japan).
DETERMINATION OF THE VERTICAL TEMPERATURE, MOISTURE, CLOUD-TOP-HEIGHT AND OTHER METEOROLOGICAL PARAMETERS
Tadao Aoki and Shinobu Nakajima *In its* Sum. of TOVS Data Process. System Mar. 1983 p 67-104 refs In JAPANESE; ENGLISH summary (For primary document see N83-33262 21-42)
Avail: NTIS HC A08/MF A01

N83-33270# Meteorological Satellite Center, Tokyo (Japan).
UPDATE OF INITIAL VALUES
Tadao Aoki and Shinobu Nakajima *In its* Sum. of TOVS Data Process. System Mar. 1983 p 111-121 refs In JAPANESE; ENGLISH summary (For primary document see N83-33262 21-42)
Avail: NTIS HC A08/MF A01

N83-33271# Meteorological Satellite Center, Tokyo (Japan).
ON THE DATA COMPILATION FOR THE DETERMINATION OF THE REGRESSION COEFFICIENT
Shinobu Nakajima and Tadao Aoki *In its* Sum. of TOVS Data Process. System Mar. 1983 p 123-131 In JAPANESE; ENGLISH summary (For primary document see N83-33262 21-42)
Avail: NTIS HC A08/MF A01

N83-33272# Meteorological Satellite Center, Tokyo (Japan).
DETERMINATION OF THE REGRESSION COEFFICIENTS
Tadao Aoki and Shinobu Nakajima *In its* Sum. of TOVS Data Process. System Mar. 1983 p 133-140 refs In JAPANESE; ENGLISH summary (For primary document see N83-33262 21-42)
Avail: NTIS HC A08/MF A01

N83-33273# Meteorological Satellite Center, Tokyo (Japan).
CODING AND ARCHIVING OF ATMOSPHERIC PARAMETER RETRIEVAL DATA
Shinobu Nakajima and Tadao Aoki *In its* Sum. of TOVS Data Process. System Mar. 1983 p 141-156 In JAPANESE; ENGLISH summary (For primary document see N83-33262 21-42)
Avail: NTIS HC A08/MF A01

N83-33276# Nagoya Univ. (Japan).
VHF DIRECTION FINDER FOR LOCATING LIGHTNINGS AT CLOSE RANGES
Hirokazu Yamashita, Akira Iwai, Mitsugi Satoh, and Toshio Katoh *In* Nagoya Univ. Proc. of the Res. Inst. of Atmospherics, Nagoya Univ., Vol. 30 Mar. 1983 p 15-24 refs Sponsored in part by the Japanese Ministry of Education (For primary document see N83-33274 21-42)
Avail: NTIS HC A06/MF A01

N83-33290# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
MEASUREMENTS AND STATION REPORTS [MESSUNGEN UND STATIONSBERICHTE]
Guenter Seeber *In its* The German-Austrian Doppler Campaign 1982 p 13-36 In GERMAN (For primary document see N83-33288

21-43)
Avail: NTIS HC A07/MF A01

N83-33652# Nagoya Univ. (Japan). Dept. of Electrical Engineering.
EXPERIMENT OF ARTIFICIAL LIGHTNING TRIGGERED WITH ROCKET
Kenji Horii *In* Nagoya Univ. Mem. of the Fac. of Eng., Nagoya Univ., Vol. 34, No. 1 May 1982 p 77-112 refs Sponsored in part by the Japanese Ministry of Education (For primary document see N83-33650 21-70)
Avail: NTIS HC A07/MF A01

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N83-33507 Defence Research Information Centre, Orpington (England).
RESIDUAL PHENOMENA IN ESTUARIES
R. Bonnefille May 1983 21 p refs Transl. into ENGLISH of Oceanis (France), v. 6, no. 4, 1980-81 p 343-357
(DRIC-T-6746; BR88017) Copyright. Avail: Issuing Activity

The theory of residual phenomena, based on the elimination by averaging of tide-alternating effects, is introduced. When applied to estuaries in a two dimensional system, the original circulations are revealed, the main parameters being the river discharge and the salinity gradient along the estuary. The main manifestation of these phenomena is the appearance of closed circulations near the bottom which prevent the seaward evacuation of suspended matter. Data on the Gironde estuary (France) were used to estimate the eddy dispersal coefficients which model the residual phenomena. The application of these theories of the temperature distribution indicates that in an estuary the difference between bottom and surface temperature rarely exceeds 0.5 to 1 C. Author (ESA)

N83-33508 Defence Research Information Centre, Orpington (England).
SOME EFFECTS OF THE CORIOLIS FORCE ON ESTUARINE DYNAMICS
C. LeProvost May 1983 13 p refs Transl. into ENGLISH of Oceanis (France), v. 6, no. 4, 1980-81 p 433-441
(DRIC-T-6747; BR88016) Copyright. Avail: Issuing Activity

Coriolis force effects on horizontal flows, the three dimensional structure of currents in channels, and the propagation of barotropic waves at the interface of fresh and salt water are outlined. Analytical models which characterize changes caused by the Coriolis force are summarized. Classical theories of waves in rotating environments are reviewed. Author (ESA)

N83-33509*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ARCHIVAL OF AIRCRAFT SCATTEROMETER DATA FROM AAFE RADSCAT MISSIONS
Lyle C. Schroeder and John L. Mitchell (Kentron International, Inc., Hampton, Va.) Aug. 1983 25 p refs
(NASA-TM-84608; L-15590; NAS 1.15:84608) Avail: NTIS HC A02/MF A01 CSCL 08J

Aircraft scatterometer data obtained over the ocean with the Radiometer-Scatterometer (RADSCAT) instrument is documented. The normalized radar cross section data was obtained at 13.9 GHz for a variety of ocean surface wind conditions, which are also presented. All such valid RADSCAT ocean scatterometer data for which surface truth was obtained are included, except for ice research missions during the last year of RADSCAT's lifetime. Aircraft scatterometer data obtained for the SEASAT underflights were with a second instrument, the Airborne Microwave Scatterometer (AMSCAT). The RADSCAT data are archived on card image computer tapes and on microfiche. S.L.

N83-33510# Committee on Merchant Marine and Fisheries (U. S. House).
OCEANOGRAPHY MISCELLANEOUS, PART 2
Washington GPO 1982 211 p Hearings on H.R. 3600, H.R. 6120, H.R. 6197, and H.R. 132 before the Subcomm. on Oceanog. of the Comm. on Merchant Marine and Fisheries, 97th Congr., 2nd Sess., 4 Feb., 31 Mar., 30 Apr., and 15 Jul. 1982
(GPO-11-728) Avail: Subcommittee on Oceanography

National ocean pollution planning and Great Lakes pollution act, deep seabed hard mineral resources act, and National Advisory Committee on oceans and atmosphere reauthorizations are addressed. Abandoned historical shipwrecks are also considered. N.W.

N83-33269# Meteorological Satellite Center, Tokyo (Japan).
OBJECTIVE ANALYSIS OF SEA SURFACE TEMPERATURE
Tadao Aoki and Shinobu Nakamina *In its* Sum. of TOVS Data Process. System Mar. 1983 p 105-110 refs In JAPANESE; ENGLISH summary (For primary document see N83-33262 21-42)
Avail: NTIS HC A08/MF A01

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N83-33511 Defence Research Information Centre, Orpington (England).
FUNDAMENTAL ASPECTS OF THE BIOLOGICAL EFFECTS OF NON-IONISING RADIATION
H. Pauly and J. H. Bernhardt Mar. 1983 12 p refs Transl. into ENGLISH of Arbeitsmed. Socialmed. Praeventivmed. (West Germany), v. 16, no. 2, 1981 p 29-33
(DRIC-T-6834; BR87497) Copyright. Avail: Issuing Activity

Biological effects of microwave and radiowave radiation are reviewed. The biophysical mechanisms leading to the production of heat and field induced forces and potential differences are examined at the molecular level. At frequencies < 10 kHz, the inside of cells are almost field-free, charge shifts occur inside the cell, and the cell behaves as a large dipole. At frequencies $>$ 10 MHz, the cell membrane is capacitively by passed and a large proportion of the current flows through the cell. Author (ESA)

N83-33512# Michigan State Univ., East Lansing. Dept. of Forestry.
ENVIRONMENTAL AND SOCIETAL CONSEQUENCES OF A POSSIBLE CO2-INDUCED CLIMATE CHANGE. VOLUME 2, PART 7: DIRECT EFFECTS OF INCREASED CONCENTRATIONS OF ATMOSPHERIC CARBON DIOXIDE ON MANAGED FORESTS
Larry W. Tombaugh, Donald I. Dickman, and Douglas G. Sprugel Sep. 1982 21 p refs 2 Vol.
(Contract DE-AS01-79EV-10019)
(DOE/EV-10019/7-Vol-2) Avail: NTIS HC A02/MF A01

A program of research dealing with the effects of increasing levels of carbon dioxide (CO2) in the ambient environment on forests that are managed to produce specific goods and services is described. Author

N83-33513# Purdue Univ., Lafayette, Ind. Dept. of Agronomy.
ENVIRONMENTAL AND SOCIETAL CONSEQUENCES OF A POSSIBLE CO2-INDUCED CLIMATE CHANGE. VOLUME 2, PART 8: IMPACTS OF RISING ATMOSPHERIC CARBON DIOXIDE LEVELS ON AGRICULTURAL GROWING SEASONS AND CROP WATER USE EFFICIENCIES
James E. Newman Sep. 1982 34 p refs 2 Vol.
(Contract DE-AS01-79EV-10019)
(DOE/EV-10019/8) Avail: NTIS HC A03/MF A01

The possible impacts of climate change on agricultural growing seasons and crop adaptation responses on a global basis are addressed. Author

N83-33514# Michigan State Univ., East Lansing. Dept. of Entomology.
ENVIRONMENTAL AND SOCIETAL CONSEQUENCES OF A POSSIBLE CO2-INDUCED CLIMATE CHANGE. VOLUME 2, PART 10: EFFECTS OF CLIMATE CHANGE ON AGRICULTURAL PLANT PESTS
Dean L. Haynes Oct. 1982 40 p refs 2 Vol.
(Contract DE-AS01-79EV-10019)
(DOE/EV-10019/10-Vol-2) Avail: NTIS HC A03/MF A01

Possible climatic scenarios concerning the increase of atmospheric carbon dioxide and ambient temperature are explored as they relate to the ecological principles that affect the abundance of weeds, insects, nematodes, and plant diseases. The distribution and impact of these pests on domestic and international agriculture are discussed. Pest management and researchable questions are considered. A.R.H.

N83-33515*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SHUTTLE OFT MEDICAL REPORT: SUMMARY OF MEDICAL RESULTS FROM STS-1, STS-2, STS-3, AND STS-4
Sam L. Pool, ed., Philip C. Johnson, Jr., ed., and John A. Mason, ed. Jul. 1983 102 p refs
(NASA-TM-58252; S-522; NAS 1.15:58252) Avail: NTIS HC A06/MF A01 CSCL 06E

The medical operations for the orbital test flights which includes a review of the health of the crews before, during, and immediately after the four shuttle orbital flights are reported. Health evaluation, health stabilization program, medical training, medical 'kit' carried in flight, tests and countermeasures for space motion sickness, cardiovascular, biochemistry and endocrinology results, hematology and immunology analyses, medical microbiology, food and nutrition, potable water, Shuttle toxicology, radiological health, and cabin acoustical noise are reviewed. Information on environmental effects of Shuttle launch and landing, medical information management, and management, planning, and implementation of the medical program are included. E.A.K.

N83-33516# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
THE ROLE OF PORPHYRINS AND CHLOROPHYLLS IN ARTIFICIAL PHOTOSYNTHESIS
John S. Connolly Jan. 1983 30 p refs Presented at the 4th Intern. Conf. on Photochem. Conversion and Storage of Solar Energy, Jerusalem, 8-13 Aug. 1982
(Contracts DE-AC02-77CH-00178; EG-77-C-01-4042)
(DE83-005105; SERI/TP-233-1697; CONF-8208106-1) Avail: NTIS HC A03/MF A01

The primary objective for studying artificial photosynthesis is to understand how to induce electron transfer out of an excited single state of a donor to a nearby acceptor on a time scale faster than other processes. It is equally important to understand how to stabilize the resulting charge separated state with respect to the ground state. The model systems use porphyrins and chlorophylls as sensitizers of light induced electron transfer. Both forward and reverse reactions are studied systematically with the goal of optimizing the efficiency of charge separation and the kinetics of charge stabilization. Accomplishments in the field are reviewed. DOE

N83-33517# Incell Corp., Milwaukee, Wis.
DEVELOPMENT OF HIGH ALCOHOL TOLERANT ORGANISMS. PART 1: STRAIN SELECTION AND SCREENING Annual Report, 31 Jul. 1981 - 1 Aug. 1982
Peter D. Bayne Dec. 1982 162 p refs
(Contract DE-FG07-81ID-12332)
(DE83-005260; DOE/ID-12332/T1) Avail: NTIS HC A08/MF A01

The principal objective of this study is the selection and development of an alcohol tolerant microorganism strain which will allow less water to be removed from the fermented beer, thus allowing the more energy efficient production of fuel alcohol. The program resulted in the selection of an outstanding strain of Zymomonas (B-10) for further evaluation in pilot scale fermentations and development by both mutagenesis and continuous selection. One culture strain of yeast and a number of mutant and variant strains of yeast await further evaluation for possible use as high alcohol tolerant strains in the production of power alcohol. Most important of all, the results of this investigation suggest a genetic basis, not a biochemical one, for strain differences in alcohol tolerance. It is our belief that a rational program of mass mutagenesis and screening will afford superior strains just as in the development of antibiotic yields. The automation and standardization of these mutagenic and selective regimes will allow larger samples to be screened and detect tolerance differences with greater sensitivity. DOE

N83-33518# Smithsonian Institution, Rockville, Md. Radiation Biology Lab.
PRIMARY LIGHT-HARVESTING SYSTEM: PHYCOBILISOMES AND ASSOCIATED MEMBRANES Progress Report, Dec. 1979 - Jan. 1983
Elisabeth Gantt 1983 7 p refs
(Contract DE-AS05-76ER-04310)
(DE83-011070; DOE/ER-04310/T1) Avail: NTIS HC A02/MF A01

The structure of phycobilisomes, which serve as primary light-harvesting complexes for photosynthesis, were investigated in red and blue-green algae (cyanobacteria). Structurally the phycobilisomes have the same fundamental arrangement in the various species, with allophycocyanin being in the core from which peripheral rods composed of phycocyanin or phycocyanin-phycoerythyrin radiate. Such studies were extended to show that energetically functional phycobilisomes could be formed in vitro from separated fractions of allophycoyanin and phycoerythrin-phycocyanin within the same species (Nostoc) and between separate species (Fremyella and Nostoc). A large (95 kD) blue-colored polypeptide is being regarded as an anchor component between phycobilisomes and thylakoids. The polypeptide, isolated from phycobilisomes, had two long wavelength-emitting types of chromophores, one similar to allophycocyanir and another to chlorophyll. Such a large (95 kD) polypeptide occurred in phycobilisomes of red and blue-green algae examined, with the exception of Anacystis where it was somewhat smaller (75 kD). The effect of light quality on phycobilisome structure varied among the blue-green species studied. The relationship of the photosystems and phycobilisomes was investigated in Anacystis wild type cells, and in mutants deficient in phycocyanin. DOE

N83-33519# Rochester Univ., N. Y. Dept. of Radiation Biology and Biophysics.
CRITERIAL FOR ELECTRIC FIELD BIOEFFECTS INVESTIGATIONS AND RISK ASSESSMENT
Sol M. Michaelson 1983 20 p refs Presented at the IEEE/ESMO Conf., Atlanta, 9 Jun. 1983
(Contract DE-AC02-76EV-03490)
(DE83-010193; DOE/EV-03490/2250; CONF-830626-1; UR-3490-2250) Avail: NTIS HC A02/MF A01

The biological effects of electric fields (EF) were investigated on small rodents which have many physical and physiological attributes which are significantly different from those of man. Many factors must be considered in the design of experiments using organisms other than man as a test subject. These include the species, strain, sex, age of the animal, the methods of caring for the test animals, the animals feeding patterns, the roles of seasonal and circadian rhythms, biological drifts, temperature and humidity. The reliability of laboratory studies using experimental animal models depends on the following considerations: (1) the selection of the animal model with consideration of its cognitive limits; (2) scaling factors associated with the nature of the field in the laboratory investigation of the biological processes using animal models; and (3) the methods by which the extrapolation of the data from the animal models relate to human studies. DOE

N83-33520# Argonne National Lab., Ill. Chemistry Div.
STRUCTURAL AND MECHANISTIC STUDIES OF NATURAL AND

ARTIFICIAL PHOTOSYNTHESIS
J. R. Norris, M. K. Bowman, M. C. Thurnauer, and M. R. Wasielewski 1983 7 p refs Presented at the 7th DOE Solar Energy Res. Conf., San Francisco, 1 Jun. 1983
(Contract W-31-109-eng-38)
(DE83-010745; CONF-830614-3) Avail: NTIS HC A02/MF A01

The mechanistic and structural details of natural photosynthesis that appear to be crucial to the design of artificial solar energy devices are discussed. At the same time, molecules are synthesized to serve as biomimetic models of natural energy conversion molecules. The photophysics and photochemistry of these molecules are investigated with primary emphasis on light induced electron transfer reactions. The information derived from studies of these models is integrated with that obtained from the natural photosynthetic process in an iterative fashion that leads to better understanding of both the natural and laboratory photosynthetic systems. DOE

N83-33521# Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands). Health Sciences Div.
DNA STRAND BREAKAGE AND REJOINING IN CULTURED HUMAN FIBROBLASTS EXPOSED TO FAST NEUTRONS OR GAMMA RAYS
G. P. vanderSchans, M. C. Paterson, and W. G. Cross Jan. 1983 23 p refs Prepared in cooperation with Atomic Energy of Canada Ltd., Chalk River, Ontario
(Contract A82/K/009; Grant Euratom-200-76-BIO-N)
(MBL-1983-5; TDCK-77628) Avail: NTIS HC A02/MF A01

Human cells were irradiated with low doses of either 60 Co gamma rays or 14.6 MeV neutrons at 0 C (0 to 5 Gy for measurement of single-strand breaks by alkaline elution and 0 to 50 Gy for double-strand breaks measured by neutral elution). The yield of single-strand breaks induced by neutrons is 30% of that produced by the same dose of gamma rays; in the induction of double-strand breaks neutrons are 1.6 times as effective as gamma rays. Upon postirradiation incubation of cells at 37 C, neutron-induced single-strand and double-strand breaks were rejoined with a similar time-course as gamma induced breaks. Rejoining followed biphasic kinetics. Of the single-strand breaks, 50% disappear within 2 min for gamma rays and 6 to 10 min for neutrons; 50% of the double-strand breaks disappear within 10 min for gamma rays and neutrons. Cells derived from patients suffering from ataxia-telangiectasia show the same capacity for repair of single and double-strand breaks induced by 14.6 MeV neutrons, as cells established from normal donors. Author (ESA)

N83-33522# Societe Nationale Industrielle Aerospatiale, Suresnes (France). Lab. Central.
BIOCORROSION, TREATMENT AND PROTECTION OF FUEL TANKS FROM MICROORGANISMS [BIOCORROSION TRAITEMENTS ET PROTECTION DES RESERVOIRS STRUCTURAUX AUX MICROORGANISMES]
G. Dallemagne 16 Nov. 1982 39 p refs In FRENCH
(SNIAS-831-551-102; C.44.293) Avail: NTIS HC A03/MF A01

The bacteria, fungi, and actinomycetes which cause biocorrosion are described, along with the influence of water, impurities, and surfactants. Initiation of biocorrosion from when the kerosene leaves the refinery until it reaches the aircraft is discussed. Detection methods are listed. Since biocorrosion arises when water gets into the fuel, and it is impossible to eliminate all traces of water, ways of slowing microorganisms development, e.g., use of fungicides, avoiding tensioactive substances which enable water to remain in suspension, are suggested. Author (ESA)

N83-33523# Joint Publications Research Service, Arlington, Va.
USSR REPORT: LIFE SCIENCES. BIOMEDICAL AND BEHAVIORAL SCIENCES, NO. 39
2 Aug. 1983 113 p refs Transl. into ENGLISH from various Russian articles
(JPRS-84024) Avail: NTIS HC A06

Aerospace medicine, agrotechnology, biochemistry, biophysics, biotechnology, environment, epidemiology, food technology, genetics, immunology, laser effects, marine mammals, medicine, microbiology, pharmacology and toxicology, and public health are discussed. For individual titles, see N83-33524 through N83-33526.

N83-33524# Joint Publications Research Service, Arlington, Va.
FLIGHT INTO THE STRATOSPHERE c52
N. Rudnyy *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 39 (JPRS-84024) 2 Aug. 1983 p 1-4 Transl. into ENGLISH from Aviat. Kosmonavt. (USSR), no. 4, Apr. 1983 p 38-39 (For primary document see N83-33523 21-51)
Avail: NTIS HC A06

High altitude flight experience is narrated. Author

N83-33525# Joint Publications Research Service, Arlington, Va.
USE OF ELECTROENCEPHALOGRAPHY TO ESTIMATE THE INFLUENCE OF LASER IRRADIATION ON THE HUMAN BODY c52
V. P. Zotkina, A. A. Komarova, and T. F. Markova *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 39 (JPRS-84024) 2 Aug. 1983 p 34-37 refs Transl. into ENGLISH from Gig. Sanit. (USSR), no. 5, 1980 4 p (For primary document see N83-33523 21-51)
Avail: NTIS HC A06

The electrical activity of the brain was studied in a group of workers operating optical lasers. Author

N83-33526# Joint Publications Research Service, Arlington, Va.
COMPARATIVE STUDY OF BIOLOGICAL PROPERTIES OF PLASMID AND NATIVE HUMAN INTERFERON c52
Yu. A. Ovchinnikov, V. M. Zhdanov, V. D. Solovyev, A. S. Novokhatskiy, R. D. Aspetov, T. B. Shaykhinov, G. K. Savitskiy, Ye. D. Sverdlov, S. A. Tsarev, G. S. Monastyrskaya et al *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 39 (JPRS-84024) 2 Aug. 1983 p 65-74 refs Transl. into ENGLISH from Vopr. Virusol. (USSR), no. 1, Jan.-Feb. 1983 p 14-21 (For primary document see N83-33523 21-51)
Avail: NTIS HC A06

Biological properties of human plasmid (alpha-F and alpha-F/D) and native (alpha, beta and gamma) interferous were studied. Author

N83-33252# Academy of Sciences (USSR), Moscow.
RELATIONSHIP OF GAS EXCHANGE AND PRODUCTIVITY OF AGROCENOSE (RESULTS OF INVESTIGATIONS IN HERMETIC PHYTOTRONE)
N. T. Nilovskaya, G. F. Korzheva, and M. O. Smirnov *In its* Geosystem Studies for Monitoring 1981 p 116-124 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

N83-33253# Academy of Sciences (USSR), Moscow.
DETERMINATION OF OPTICAL RADIATION ENERGY EXPENSES FOR PLANT AUTOREGULATION
I. I. Tkatchenko *In its* Geosystem Studies for Monitoring 1981 p 124-130 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

N83-33254# Academy of Sciences (USSR), Moscow.
RELATION OF DYNAMICS OF SOIL MICROORGANISMS AND DYNAMICS OF UNDERGROUND PHYTOMASS
E. P. Pimenov and Hoang Chung *In its* Geosystem Studies for Monitoring 1981 p 130-134 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

N83-33255# Academy of Sciences (USSR), Moscow.
FUNCTIONAL STRUCTURE OF SOME NORTHERN STEPPE PHYTOCENOSES
N. A. Cibanova *In its* Geosystem Studies for Monitoring 1981 p 134-147 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

N83-33257# Academy of Sciences (USSR), Moscow.
MONITORING OF CHLOROPHYLL CONTENT IN FOREST-STEPPE PHYTOCENOSES BY REMOTE SENSING METHODS
I. Ph. Petrova *In its* Geosystem Studies for Monitoring 1981 p 155-160 refs In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

52 AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and weightlessness.

N83-33527 Defence Research Information Centre, Orpington (England).
IMMUNOLOGICAL PROTECTION IN DISASTERS
W. H. Fischer May 1983 14 p Transl. into ENGLISH from Wehrmed. Monatschr. (West Germany), v. 25, no. 8, 1981 p 271-276
(DRIC-T-6929; BR88240) Copyright. Avail: Issuing Activity

Protection of wounds against infection, burns, and the effects of biological warfare agents and nuclear radiation are discussed. Prevention of epidemics and mass vaccination during nuclear war are considered. It is concluded that almost nothing can be done to protect the population against infection during a major catastrophe, for medical and organizational reasons. Author (ESA)

N83-33528# Japanese Air Self-Defense Force, Tokyo.
THE REPORTS OF THE AEROMEDICAL LABORATORY, VOLUME 24, NO. 1, MARCH 1983
Mar. 1983 68 p refs In JAPANESE; ENGLISH summaries (ISSN-0023-2858) Avail: NTIS HC A04/MF A01

Reports from the Japanese Aeromedical Laboratory physical fitness of fighter pilots are presented. Special attention is given to the use of a human centrifuge in studying the effects of high G-forces. For individual titles, see N83-33529 through N83-33533.

N83-33529# Japanese Air Self-Defense Force, Tokyo. Aeromedical Lab.
THE ESTIMATION OF PHYSICAL FITNESS BY 1,500m RUNNING TIME
Chiego Mizumoto and Noriko Nitami *In its* The Repts. of the Aeromed. Lab., Vol. 24, No. 1, Mar. 1983 Mar. 1983 p 1-10 refs In JAPANESE; ENGLISH summary (For primary document see N83-33528 21-52)
Avail: NTIS HC A04/MF A01

In general, maximal oxygen intake is the best index to evaluate the physical fitness, i.e. aerobic power. But this method is difficult to measure and time - consuming for the estimation of aerobic power of many persons. So aerobic power is usually assessed by such indices as step test score, running performance. Cooper, K. H. reported that the performance of 12-min. test correlated very highly with the maximal oxygen intake. The correlation between the performances of 12-min. test and 1,500m run was obtained and evaluated in order to estimate the aerobic power by the 1,500m running time, because the record of 1,500m run has been measured in physical fitness test instead of 12-min. test in JASDF. L.F.M.

N83-33530# Japanese Air Self-Defense Force, Tokyo. Aeromedical Lab.
OPERATIONAL UTILIZATION STUDY ON NEW HUMAN CENTRIFUGE OF JASDF. (5): ON PILOT PERFORMANCE MEASUREMENT SYSTEM (PPMS)
Atsushi Kadoo, Yuko Nagasawa, and Sadahito Aramaki *In its* The Repts. of the Aeromed Lab., Vol. 24, No. 1, Mar. 1983 Mar. 1983 p 11-22 refs In JAPANESE; ENGLISH summary (For primary document see N83-33528 21-52)
Avail: NTIS HC A04/MF A01

The operational utilization study on the PPMS equipped in the new human centrifuge of the Aeromedical Laboratory was carried out to develop the anti-G training and evaluation system of high performance fighter pilot in JASDF. The PPMS consists of on-set tracking task and sustained tracking task. During a ten-second on-set task, trainee has to track a target which is vertically moved from over head to front panel (position of gun-sight and Head-up-display) by back pressure of control stick. During a 30 second sustained task, trainee has to track a target which is displayed on Head-up-display and to shoot a bullet in a fixed range. Main findings and results were as follows: (1) The tracking errors during late period of the on-set tracking task suggested a possibility to evaluate pilot performance in each rate of on-set G. (2) The tracking errors during sustained tracking task suggested a possibility to evaluate pilot performance in each G-level at 4.5 and 6Gz. L.F.M.

N83-33531# Japanese Air Self-Defense Force, Tokyo. Aeromedical Lab.
OPERATIONAL UTILIZATION STUDY ON NEW HUMAN CENTRIFUGE OF JASDF. (6): AUTOMATIC MEASURING SYSTEM OF VISUAL FIELD
Kiyoshi Mizumoto and Mikio Ono *In its* The Repts. of the Aeromed. Lab., Vol. 24, No. 1, Mar. 1983 Mar. 1983 p 23-30 refs In JAPANESE; ENGLISH summary (For primary document see N83-33528 21-52)
Avail: NTIS HC A04/MF A01

In support of the high - acceleration-cockpit problem, the perimeter was designed and installed into the new JASDF human centrifuge. The outline of the perimeter system to record the G-induced visual concentration is given. The G stress by the human centrifuge can be contolled manually and automatically with the aid of mini-computer with an accuracy of 0.1 G. The perimeter, an arc of a circle of 76cm radius, consists of a liner array of 120 amber LED lamps at 1 deg increments of a bar subtending 60 deg of visual angle on each side of a central red lamp. When a subject presses the switch symmetrical two amber lamps are lighted sequentially from the periphery to the central red lamp. Depressing the switch he can light two lamps reversely, namely from the central to the periphery. The subject is able to track the symmetrical lamps and keep them lighted on the margin of his visual field, fixating the central red lamp. L.F.M.

N83-33532# Japanese Air Self-Defense Force, Tokyo. Aeromedical Lab.
OPERATIONAL UTILIZATION STUDY ON NEW HUMAN CENTRIFUGE OF JASDF. (7): ACCELERATION PATTERNS FOR ANTI-G TRAINING AND TRAINING PROGRAM
Masaaki Iwane and Chiharu Sekiguchi *In its* The Repts. of the Aeromed. Lab., Vol. 24, No. 1, Mar. 1983 Mar. 1983 p 31-46 refs (For primary document see N83-33528 21-52)
Avail: NTIS HC A04/MF A01

The G-tolerance of the fighter pilot is important issue in the modern fighter aircraft. In recent years, performance of maneuverability of the fighter aircraft has made remarkable advances, however, less advance of human physiological function has been seen. It is an important problem how to overcome against G-stress, and to enhance pilot capability during aerial combat maneuver. Therefore, a new human centrifuge was developed in the Aeromedical Laboratory for the G-training of high performance jet pilots in JASDF. Acceleration patterns for anti-G training and the training program are discussed. L.F.M.

N83-33533# Japanese Air Self-Defense Force, Tokyo. Aeromedical Lab.
OPERATIONAL UTILIZATION STUDY ON NEW HUMAN CENTRIFUGE OF JASDF. (8): ANTI-G TRAINING PATTERN AND ITS APPLICATION FOR A TRIAL TRAINING COURSE OF F-15 IN JASDF
Masaaki Iwane, Chiharu Sekiguchi, Akio Nakamura, Tsutomu Kitanosono, Masaharu Aoki, and Shoji Shimizu *In its* The Repts. of the Aeromed. Lab., Vol. 24, No. 1, Mar. 1983 Mar. 1983 p 47-60 refs In JAPANESE; ENGLISH summary (For primary document see N83-33528 21-52)
Avail: NTIS HC A04/MF A01

Anti-G training patterns study were applied for a trial training course of F-15 in JASDF. G-patterns were repetitively exposed to the trainees and were discussed for setting up the effective

G-pattern of anti-G training. Some of the characteristics of G-pattern which represent in terms of G-rate, G-level and G-duration (sustained time) were revised and retested by the well trained subjects in the Aeromedical Laboratory. L.F.M.

N83-33534 Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
THE MEASUREMENT OF VISUAL MOTION
Ellen C. Hildreth and Shimon Ullman Dec. 1982 28 p refs
(Contract N00014-80-C-0505; Grant NSF MCS-79-23110)
(AD-A128398; AI-M-699) Avail: NTIS HC A03/MF A01 CSCL 06/4

The analysis of visual motion divides naturally into two stages: the first is the measurement of motion, for example, the assignment of direction and magnitude of velocity to elements in the image, on the basis of the changing intensity pattern; the second is the use of motion measurements, for example, to separate the scene into distinct objects, and infer their three dimensional structure. In this paper, we present a computational study of the measurement of motion. Similar to other visual processes, the motion of elements is not determined uniquely by information in the changing image; additional constraint is required to compute a unique velocity filed. Given this global ambiguity of motion. Local measurements from the changing image, such as those provided by directionally-selective simple cells in primate visual cortex, cannot possibly specify a unique local velocity vector, and in fact, specify only one component of velocity. Computation of the full two dimensional velocity field requires the integration of local motion measurements, either over an area, or along contours in the image. We will examine possible algorithms for computing motion, based on a range of additional constraints. Finally, we will present implications for the biological computation of motion. GRA

N83-33535# Brookhaven National Lab., Upton, N. Y. Medical Research Center.
IN VIVO MONITORING OF HEAVY METALS IN MAN: CADMIUM AND MERCURY
Kenneth J. Ellis, David Vartsky, and Stanton H. Cohn 1982 5 p refs Presented at the Workshop on Uses of Nuclear Analytical Methods in Metal Toxicology, Upton, N.Y., 11 Oct. 1982
(Contract DE-AC02-76CH-00016)
(DE83-005148; BNL-32243; CONF-8210106-2) Avail: NTIS HC A02/MF A01

Direct in vivo measurements of selected heavy metals by nuclear analytical techniques are discussed. Cadmium and mercury are retained in the body in sufficient quantities for their detection by neutron activation analysis. Autopsy data on cadmium of adult male nonsmokers living in the U.S. indicates an average body burden of 30 mg by age 50. The distribution of cadmium in the body, however, is nonuniform, approximately 50% being located in the kidneys and liver. The increased concentration of cadmium within these organs made possible the direct in vivo measurements of this metal by prompt gamma neutron activation analysis (PGNAA). At present, in vivo determination of mercury were performed on phantoms only. These in vivo techniques provide a unique method of obtaining accurate organ burden data in humans that can be related to the toxicological effects of these metals. DOE

N83-33536# Michigan Univ., Ann Arbor. Transportation Research Inst.
BIOMECHANICAL ACCIDENT INVESTIGATION METHODOLOGY Final Report, Jul. 1981 - Jan. 1983
D. H. Robbins, J. W. Melvin, D. F. Huelke, and H. W. Sherman Feb. 1983 106 p refs Sponsored in part by Motor Vehicle Manufacturers Assoc.
(PB83-184366; UMTRI-83-3) Avail: NTIS HC A06/MF A01 CSCL 13L

The purpose of this project was to combine presently available advanced computer modelling techniques for reconstructing a crash sequence to the development of methods for determining occupant contact velocities, impact forces and occupant responses in passenger car accidents. This was a preliminary study which was intended to develop a methodology to analyze real-world accidents and to investigate the applicability of computerized vehicle crash and occupant motion simulation modeling techniques to the improvement of accident investigation-based biomechanics data and staged laboratory collision tests. Author (GRA)

N83-33524# Joint Publications Research Service, Arlington, Va.
FLIGHT INTO THE STRATOSPHERE
N. Rudnyy *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 39 (JPRS-84024) 2 Aug. 1983 p 1-4 Transl. into ENGLISH from Aviat. Kosmonavt. (USSR), no. 4, Apr. 1983 p 38-39 (For primary document see N83-33523 21-51)
Avail: NTIS HC A06

N83-33525# Joint Publications Research Service, Arlington, Va.
USE OF ELECTROENCEPHALOGRAPHY TO ESTIMATE THE INFLUENCE OF LASER IRRADIATION ON THE HUMAN BODY
V. P. Zotkina, A. A. Komarova, and T. F. Markova *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 39 (JPRS-84024) 2 Aug. 1983 p 34-37 refs Transl. into ENGLISH from Gig. Sanit. (USSR), no. 5, 1980 4 p (For primary document see N83-33523 21-51)
Avail: NTIS HC A06

N83-33526# Joint Publications Research Service, Arlington, Va.
COMPARATIVE STUDY OF BIOLOGICAL PROPERTIES OF PLASMID AND NATIVE HUMAN INTERFERON
Yu. A. Ovchinnikov, V. M. Zhdanov, V. D. Solovyev, A. S. Novokhatskiy, R. D. Aspetov, T. B. Shaykhinov, G. K. Savitskiy, Ye. D. Sverdlov, S. A. Tsarev, G. S. Monastyrskaya et al *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 39 (JPRS-84024) 2 Aug. 1983 p 65-74 refs Transl. into ENGLISH from Vopr. Virusol. (USSR), no. 1, Jan.-Feb. 1983 p 14-21 (For primary document see N83-33523 21-51)
Avail: NTIS HC A06

N83-33662# Tokyo Denki Univ. (Japan).
THE LINEAR PHASE FIR REAL-TIME FILTER FOR BIO SIGNAL PROCESSING IMPLEMENTED WITH 8 BIT MICROPROCESSOR
Tatsuo Ishihara, Shogo Nakamura, and Makoto Kotani *In its* Res. Repts. of the Fac. of Eng., Tokyo Denki Univ., No. 30 Dec. 1982 p 77-87 refs In JAPANESE; ENGLISH summary (For primary document see N83-33656 21-70)
Avail: NTIS HC A08/MF A01

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N83-33537*# Massachusetts Inst. of Tech., Cambridge. Div. of Health Sciences and Technology.
VISUAL SCANNING BEHAVIOR AND PILOT WORKLOAD Final Report
J. R. Tole, A. T. Stephens, M. Vivaudou, A. Ephrath, and L. R. Young Washington NASA Aug. 1983 50 p refs
(Contract NCC1-23)
(NASA-CR-3717; NAS 1.26:3717) Avail: NTIS HC A03/MF A01 CSCL 05I

Sophisticated man machine interaction often requires the human operator to perform a stereotyped scan of various instruments in order to monitor and/or control a system. For situations in which this type of stereotyped behavior exists, such as certain phases of instrument flight, scan pattern was shown to be altered by the imposition of simultaneous verbal tasks. A study designed to examine the relationship between pilot visual scan of instruments and mental workload is described. It was found that a verbal loading task of varying difficulty causes pilots to stare at the primary instrument as the difficulty increases and to shed looks at instruments of less importance. The verbal loading task also

affected the rank ordering of scanning sequences. By examining the behavior of pilots with widely varying skill levels, it was suggested that these effects occur most strongly at lower skill levels and are less apparent at high skill levels. A graphical interpretation of the hypothetical relationship between skill, workload, and performance is introduced and modelling results are presented to support this interpretation. S.L.

N83-33538*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THE WINDOW OF VISIBILITY: A PSYCHOLOGICAL THEORY OF FIDELITY IN TIME-SAMPLED VISUAL MOTION DISPLAYS
Andrew B. Watson, Albert Ahumada, Jr., and Joyce E. Farrell Aug. 1983 22 p refs
(NASA-TP-2211; A-9270; NAS 1.60:2211) Avail: NTIS HC A02/MF A01 CSCL 05I

Many visual displays, such as movies and television, rely upon sampling in the time domain. The spatiotemporal frequency spectra for some simple moving images are derived and illustrations of how these spectra are altered by sampling in the time domain are provided. A simple model of the human perceiver which predicts the critical sample rate required to render sampled and continuous moving images indistinguishable is constructed. The rate is shown to depend upon the spatial and temporal acuity of the observer, and upon the velocity and spatial frequency content of the image. Several predictions of this model are tested and confirmed. The model is offered as an explanation of many of the phenomena known as apparent motion. Finally, the implications of the model for computer-generated imagery are discussed. Author

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N83-33539 Defence Research Information Centre, Orpington (England).
A DUMMY FOR DETERMINING THE THERMAL EFFECTS OF THE INDOOR CLIMATE ON MAN
V. Korsgaard and T. Lund Madsen Jun. 1983 15 p Transl. into ENGLISH from VVS (Denmark), no. 9, 1967 p 407-412
(DRIC-T-6924; BR88241) Copyright. Avail: Issuing Activity

A dummy divided into 39 sections, each with a heat source, thermostat and surface temperature probe, so that it is possible to find the relation between heat input and surface temperature for each individual section, is described. Parts are made as cylinders or rectangles, giving production and measurement advantages. The dummy is used for evaluations of climate quality, for example, when designing air conditioning. Measuring accuracy is + or - 0.5 k cal/hr sqm for heat loss. Total heat emission and mean surface temperature of the dummy can be calculated every half hour. The times for and the sizes of the greatest and least deviations from the normal temperature for the individual sections can be obtained. Author (ESA)

N83-33540# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Afd. Technische Menskunde.
SOME ASPECTS OF THE USE OF THE ALPHANUMERIC DISPLAY IN THE CENTRAL CONTROL POSITION (CCP) IN WALRUS-CLASS SUBMARINES
J. Vermeulen and A. deJong Nov. 1982 20 p refs In DUTCH; ENGLISH summary
(Contract A79/KM/134)
(IZF-1982-33; TDCK-77333) Avail: NTIS HC A02/MF A01

In order to assess user compatibility, a military specification plasma display was studied because of the high demands with regard to shock resistance and the number of lines on one page. Readability of the characters, luminance of the text, reflections, and data presentation were tested. The readability of the smallest capitals (5 x 7 matrix) is sufficient for use in the CCP. In combination with a gray additional filter the luminances of the text that can be realized with the dimmer are sufficient under all ambient lighting conditions in the action control room. However, the dimmer can cause mutilation of the characters. Reflections on the coated front plate of the plasma display remain within the standard values. Proposals are made for the layout of the data presentation on the display. It is possible to present the data correctly from a human factors point of view, if a number of technical modifications are carried out. Author (ESA)

55 PLANETARY BIOLOGY

Includes exobiology; and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

No abstracts in this category.

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.
For components see *33 Electronics and Electrical Engineering.*

N83-33541 Royal Signals and Radar Establishment, Malvern (England).
THE AXIS TEST BOX HARDWARE REPORT
A. L. Simcock 1983 21 p
(RSRE-Memo-3584; BR88202) Copyright. Avail: Issuing Activity

Circuit functions and interactions of the AXIS test box, and interfaces with other units are described. The hardware is housed in a 19 in. rack which takes standard double euro cards with indirect edge connectors. The backplane of the test box rack is an extension to the standard DISCUS backplane. The DISCUS has a 16k RAM of which 6k bytes are used by the test box program; a 16k PROM with 8k bytes for the test box; two programmable peripheral interface cards; and an M6809 microprocessor. These are interfaced with specially designed output buffer and input buffer cards linked to an external interface card for the system under test. Author (ESA)

N83-33542# Massachusetts Inst. of Tech., Cambridge. Lab. for Computer Science.
COMPUTER SYSTEMS AND COMMUNICATIONS Progress Report, Jul. 1980 - Jun. 1981
Michael L. Dertouzos 1 Apr. 1983 288 p refs
(Contract N00014-75-C-0661)
(AD-A127586; LCS-PR-18; PR-18) Avail: NTIS HC A13/MF A01 CSCL 09/2

Research performed by the MIT Laboratory for Computer Science from July 1, 1980 through June 30, 1981 is discussed. Computer systems and communications, computer systems structure, Educational computing, and message passing semantics are among the many topics that are summarized. R.J.F.

N83-33543# California Univ., Livermore. Lawrence Livermore Lab.
S-1 MULTIPROCESSOR SYSTEM

J. M. Broughton, P. M. Farmwald, and T. M. McWilliams 2 Apr. 1982 7 p refs Presented at the Soc. of Photo-Opt. Instrumentation Engr. Tech. Symp., Arlington, Va. 3-7 May 1982
(Contract W-7405-eng-48)
(DE83-000735; UCRL-87494; CONF-820585-2) Avail: NTIS HC A02/MF A01

The S-1 multiprocessor system is described. It is composed of 16 supercomputer class uniprocessors with local caches, an extremely large, medium latency shared memory, and a low latency synchronization bus for passing short messages. The system is applicable to a wide variety of applications, including large-scale physical simulation, real-time command and control, and program development in a time-sharing environment. The hardware organization, its implications, and software supporting the efficient utilization of the multiprocessor are discussed. DOE

N83-33544# California Univ., Livermore. Lawrence Livermore Lab.
USING CALCULATORS AND COMPUTERS IN THE SHOP
Norman J. Brown 15 Oct. 1982 8 p refs Presented at the Opt. Soc. of Am. Workshop on Opt. Fabric. and Testing, Palo Alto, Calif., 13 Dec. 1982 Submitted for publication
(Contract W-7405-eng-48)
(DE83-001188; UCRL-88270; CONF-821208-4) Avail: NTIS HC A02/MF A01

This paper exemplifies the planning of an aspheric figuring process. Since the calculations are treated in the literature, it will concentrate on the flow logic, a simplified block diagram necessary to make these practically available on a routine basis to an optician on the shop floor. DOE

N83-33545# Stanford Linear Accelerator Center, Calif. Dept. of Electronics.
I/O REGISTER TO FASTBUS INTERFACE
C. A. Logg and L. Paffrath Sep. 1982 4 p refs Presented at the IEEE Nucl. Sci. Symp., Washington, D. C., 20-22 Oct. 1982
(Contract DE-AC03-76SF-00515)
(DE83-004390; SLAC-Pub-2972; CONF-821011-36) Avail: NTIS HC A02/MF A01

An input/output register to FASTBUS interface (IORFI) was designed which provides an inexpensive and simple means to connect a computer to a FASTBUS backplane segment. The FASTBUS interface is built on a single width FASTBUS module. It is connected to a computer by two 16-bit parallel input registers and two 16-bit parallel output registers, which makes the interface computer-non-specific. The operational characteristics of this interface, its advantages, limitations, and the uses to which it has been put are described. DOE

N83-33546# Argonne National Lab., Ill.
LOGIC MACHINE ARCHITECTURE: KERNEL FUNCTIONS
Ewing L. Lusk (Northern Illinois Univ.), William W. McCune (Northwestern Univ.), and Ross A. Overbeek (Northern Illinois Univ.) 1982 15 p refs Presented at the 6th CADE Conf. on Automated Deduction, New York, 1 Jun. 1982
(Contract W-31-109-eng-38; Grants NSF MCS-79-03870; NSF MCS-79-13252)
(DE83-010629; CONF-8206178-4) Avail: NTIS HC A02/MF A01

An attempt is made to abstract from the great diversity of approaches to automated deduction a core collection of operations which are common to all of them. Implementation of this kernel of functions provides a software platform upon which a variety of theorem-proving systems can be built. The architecture for a layered family of software tools to support the development of theorem-proving systems is outlined the functions which comprise the two lowest layers are given in sore detail. These are the layer implementing primitive abstract data types not supported by the host language and the layer providing primitives for the manipulation of logical formulas. This layer includes the implementation of efficient unification and substitution application algorithms, structure sharing within the formula database, and efficient access to formulas via arbitrary user-defined properties. The tools are provided in a highly portable form (implemented in Pascal) in order that a diverse community of users may build on them. DOE

N83-33547# Argonne National Lab., Ill.
LOGIC MACHINE ARCHITECTURE: INFERENCE MECHANISMS
Ewing L. Lusk (Northern Illinois Univ.), William W. McCune (Northwestern Univ.), and Ross A. Overbeek (Northern Illinois Univ.) 1982 23 p refs Presented at the 6th CADE Conf. on Automated Deduction, New York, 1 Jun. 1982
(Contract W-31-109-eng-38; Grants NSF MCS-79-03870; NSF MCS-79-13252)
(DE83-010721; CONF-8206178-3) Avail: NTIS HC A02/MF A01

Logic Machine Architecture (LMA) is a layered implementation of theorem-proving tools. The layer described contains resolution- and equality-based inference rules, subsumption, and demodulation. It is designed to provide all of the tools required to create a theorem-prover with minimal effort. Athough LMA is currently implemented in Pascal, an interface to LISP will be included in the original release. The design principles and techniques used in layer 2, as well as two simple provers which illustrate the services of layer 2 - one written in LISP and the other in Pascal are given. DOE

N83-33548# Illinois Univ., Urbana. Dept. of Computer Science.
GENERAL PURPOSE PDP-11 INTERFACE PROCESSOR
James Purtilo Oct. 1982 37 p refs
(Contract DE-AC02-76ER-02383)
(DE83-009574; DOE/ER-02383/0087; COO-2383-0087; UIUCDCS-R-82-1107) Avail: NTIS HC A03/MF A01

The Z80 interface card (Zcard) is a general purpose microprocessor which is directly interfaced to the Whaley multiplexor, itself implemented on PDP-11 series computers at the University of Illinois. The Zcard provides two serial ports at FAI interface levels and contains up to 16K of local memory. The principal function of the Zcard is to serve as an interface in which the user might alter protocols, change interface characteristics (e.g., baud rate, hardware echo, or flow control), or switch between synchronous and asynchronous modes all under software control. In addition, the Zcard provides extra lines for control of external devices (e.g. modem) and input of status data. In the simpliest use, the Zcard runs a program, downloaded from the PDP-11, which emulates the level EIAFB card (previously developed for the Whaley Multiplexor) for serial communication with terminals. Using no flow control, Zcard performance seems superior to that of the EIAFB card in that no characters are lost under normal use (due to the much larger buffer which the Zcard can provide). DOE

N83-33549# Brookhaven National Lab., Upton, N. Y.
POWER-SUPPLY REGULATION BY MICROPROCESSOR
J. Sheehan and H. Langenbach 1983 4 p ref Presented at the Particle Accelerator Conf., Santa Fe, N. Mex., 21-23 Mar. 1983
(Contract DE-AC02-76CH-00016)
(DE83-010433; BNL-32767; CONF-830311-98) Avail: NTIS HC A02/MF A01

Many small-magnet power supplies are regulated by using a microprocessor system to generate control voltages to continuously servoregulate each power supply. The power supplies are of very simple design since all regulation and feedback hardware are parts of the microprocessor system. Most of the supplies are bipolar transistor followers, powered by a common unregulated dc power supply and are used to power trim steering magnets on the three NSLS synchrotron rings. Twelve-bit accuracy is obtained using commercially available microprocessor pc cards. DOE

N83-33550# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France). Div. des Systemes Balistiques et Spatiaux.
THE MAJOR DATA PROCESSING RISK
J. P. Menard (Comite de Recherche pour la Securite des Systemes d'Information Automatises), A. Pekar (Comite de Recherche pour La Securite des Systemes d'Information Automatises), J. L. Deschanels, and P. Lavedrine 1982 8 p In FRENCH; ENGLISH

summary Presented at Intern. Radiation Protect. Assoc. (IRPA) 10th Regional Congr. on Comparison of Risks Relating from Major Human Activities, Avignon, France, 18-22 Oct. 1982
(SNIAS-831-422-106) Avail: NTIS HC A02/MF A01

The practice of analysis of data processing risks (PARI) method is sketched. It forms a complete safety plan, well adapted to the specific character of data processing risk from badly-known and badly-mastered systems, and badly-perceived risks. It assesses the influence on risk level on the individual or group, and of unconscious or voluntary human behavior. The method not only allows the technical mastery of the risks, thanks to analytical tools tested in industrial spheres, but also financial mastery of safety, thanks to the estimated budgeting of the studies and of the means of prevention and protection. Author (ESA)

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N83-33551 ESDU International Ltd., London (England).
THE RESPONSE OF TWO-DEGREE-OF-FREEDOM SYSTEMS (COMPUTER PROGRAM)
Dec. 1982 46 p refs
(ESDU-82037-Amend-A; ISBN-0-85679-418-X; ISSN-0141-3988) Avail: ESDU

This Data Item is an addition to the Dynamics Subseries. The computer program presented may be used to determine the response of two degree of freedom systems to any known applied forcing functions. The program is capable of dealing with any two degree of freedom system the description of which requires two independent coordinates and which can be described by two second order constant coefficient differential equations. The independent coordinates are the dependent variables of the system. An applied input forcing function is allowed for each second order equation and to ease program input one of six possible types of input function can be specified: zero, impulsive, step, cosine, sine and an arbitrary input. The program evaluates the characteristic polynomial of the system together with the roots of this equation from which the natural frequencies and damping ratios of the two modes of response are found. ESDU

N83-33552 Royal Signals and Radar Establishment, Malvern (England).
IMAGE UNDERSTANDING FOR MILITARY SYSTEMS: A DISCUSSION OF THE WAY FORWARD FOR PRIP RESEARCH IN BRITAIN
A. C. Sleigh Feb. 1983 22 p
(RSRE-Memo-3560; BR87980) Copyright. Avail: Issuing Activity

The military relevance of PRIP is outlined, and British research planning of PRIP projects is discussed. It is suggested that UK research image processing techniques has fallen behind other countries. The multidisciplinary nature of the subject, the need to achieve a good relationship between speculative and applied research, and the high cost of capital equipment, make the setting up of Centers of Excellence paramount. More emphasis must be given to teaching image understanding in universities, as a multidisciplinary field. Author (ESA)

N83-33553 Royal Signals and Radar Establishment, Malvern (England).
SOFTWARE CONFIGURATION MANAGEMENT IN AN INTEGRATED PROGRAMMING SUPPORT ENVIRONMENT
Margaret Stanley Apr. 1983 45 p refs
(RSRE-Memo-3578; BR88136) Copyright. Avail: Issuing Activity

The development of an integrated system for software configuration management, based on the Ada programming support environment (APSE) is discussed. It is suggested that the APSE database offers facilities for defining a schema capable of supporting the requirements of configuration management, with the necessary relationships between different kinds of software configuration item, and binding together with access controls to prevent unauthorized change to the software configuration. Good schema design, together with the use of a data dictionary, make it possible to provide the reports needed for software configuration management and prevent modification of or deletion of objects on which other objects depend. Good total design preserves the integrity of the software configuration by transaction management. Author (ESA)

N83-33554# Yale Univ., New Haven, Conn. Center for Systems Science.
THE USE OF LEARNING ALGORITHMS IN TELEPHONE TRAFFIC ROUTING: A METHODOLOGY
Kumpati S. Narendra and Philip Mars (Leicester Polytechnic, England) May 1982 23 p refs
(Rept-8203) Avail: NTIS HC A02/MF A01

A unified and methodological approach to the application of learning automata to telephone network traffic routing is presented. Author

N83-33555# Oak Ridge National Lab., Tenn. Health and Safety Research Div.
MAGIC: A DIGITIZATION AND IMAGE PROCESSING PROGRAM
S. R. Glandon and D. E. Fields Aug. 1982 55 p refs
(Contract W-7405-eng-26)
(ORNL-5814) Avail: NTIS HC A04/MF A01

An interactive digitization and image processing program was developed. This program, called MAGIC (Map Analysis and Graph Interpretation Code), features two methods of digitization, a keyboard-controlled cursor and a light pen. Image processing routines include perimeter and area evaluation algorithms and an image overlay algorithm. Several output options are offered, including hardcopy generation and cassette storage of figures. MAGIC has a tutorial introduction, numerous user prompts, and a HELP command for eliciting expanded explanations of commands during program execution. The code was verified by computing perimeters and areas of regular polygons and by finding areas of selected states. It was also applied to determination of denuded area associated with strip mine sites in Tennessee and drought-impacted areas within California during 1976 and 1977. Author

N83-33556# Los Alamos Scientific Lab., N. Mex.
COMPUTER-AIDED IMAGE REGISTRATION
Clarice W. Cox Sep. 1982 14 p
(Contract W-7405-eng-36)
(LA-9507-MS) Avail: NTIS HC A02/MF A01

It is sometimes desirable in image analysis to produce an image by linearly combining two or more component images. Correlation techniques applied to highly processed digitized images can accurately register similar images. L.F.M.

N83-33557*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
GUIDELINES IN PREPARING COMPUTER-GENERATED PLOTS FOR NASA TECHNICAL REPORTS WITH THE LaRC GRAPHICS OUTPUT SYSTEM
Nancy L. Taylor Aug. 1983 112 p Revised
(NASA-TM-81908; NAS 1.15:81908) Avail: NTIS HC A06/MF A01 CSCL 09B

To response to a need for improved computer-generated plots that are acceptable to the Langley publication process, the LaRC Graphics Output System has been modified to encompass the publication requirements, and a guideline has been established. This guideline deals only with the publication requirements of computer-generated plots. This report explains the capability that authors of NASA technical reports can use to obtain publication-quality computer-generated plots or the Langley publication process. The rules applied in developing this guideline and examples illustrating the rules are included. Author

N83-33558# Electrotechnical Lab., Ibaraki (Japan).
RESEARCHES OF THE ELECTROTECHNICAL LABORATORY,

NO. 831: STUDIES ON THE RECOGNITION OF HANDPRINTED CHARACTERS BY STRUCTURAL ANALYSIS METHODS
Kazuhiko Yamamoto Feb. 1983 124 p refs
(ISSN-0366-9106) Avail: NTIS HC A06/MF A01

Input for computers is increasing everyday because of the expansion of the application field of computers. Because of this trend pattern recognition research is strongly expected to replace key-punchers. If a machine for character recognition was available, the key-punchers would become free from the heavy work for data input. Human beings have an ideal ability for recognition of characters, but how human beings recognize the characters is unknown and it is still a subject of research in psychology and physiology. Already existing techniques for character recognition are mentioned and some new algorithms are proposed. The capabilities of the algorithms are verified by computer simulations. Author

N83-33559*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
RECOMMENDED APPROACH TO SOFTWARE DEVELOPMENT
Apr. 1983 284 p refs
(NASA-TM-85401; SEL-81-205; NAS 1.15:85401) Avail: NTIS HC A13/MF A01 CSCL 09B

A set of guidelines for an organized, disciplined approach to software development, based on data collected and studied by the Software Engineering Laboratory (SEL) since 1977 for 46 flight dynamics software development projects is presented. It describes methods and practices for each phase of a software development life cycle that starts with requirements analysis and ends with acceptance testing; maintenance and operation is not addressed. For each defined life cycle phase, this document presents guidelines for the development process and its management, and the products produced and their reviews. Author

N83-33560*# Computer Software Management and Information Center, Athens, Ga.
COMPUTER SOFTWARE MANAGEMENT AND INFORMATION CENTER Monthly Progress Report
15 Aug. 1983 35 p
(Contract NASw-3247)
(NASA-CR-172977; NAS 1.26:172977) Avail: NTIS HC A03/MF A01 CSCL 09B

Computer programs for passive anti-roll tank, earth resources laboratory applications, the NIMBUS-7 coastal zone color scanner derived products, transportable applications executive, plastic and failure analysis of composites, velocity gradient method for calculating velocities in an axisymmetric annular duct, an integrated procurement management system, data I/O PRON for the Motorola exorcisor, aerodynamic shock-layer shape, kinematic modeling, hardware library for a graphics computer, and a file archival system are documented. Author

N83-33561*# Kentron Technical Center, Hampton, Va.
PROTOPTYPE INTEGRATED DESIGN (PRIDE) SYSTEM REFERENCE MANUAL. VOLUME 2: SCHEMA DEFINITION Final Report
Paul A. Fishwick, Thomas R. Sutter, and Charles L. Blackburn Jul. 1983 28 p refs
(Contract NAS 1-16000)
(NASA-CR-172183; NAS 1.26:172183) Avail: NTIS HC A03/MF A01 CSCL 09B

An initial description of an evolving relational database schema is presented for the management of finite element model design and analysis data. The report presents a description of each relation including attribute names, data types, and definitions. The format of this report is such that future modifications and enhancements may be easily incorporated. Author

N83-33562# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio. Support Systems Branch.
CRITICAL ITEM PRODUCT FUNCTION SPECIFICATION FOR THE MULTIPROCESSOR SHARED MEMORY (MSM) Final Report, May 1979 - Nov. 1982
Jahn A. Luke, Dan Weiss, and Jerry Shaw Jan. 1983 105 p
(AD-A126634; AFWAL-TR-83-1024-Vol-2) Avail: NTIS HC A06/MF A01 CSCL 09/2

A specification that establishes the performance, design, and testing of the Multiprocessor Shared Memory (MSM) is presented. The MSM is a device that has been designed to supersede the DMA10, a direct memory access device built by the Digital Equipment Corporation (DEC). The MSM provides common memory for the DECsystem-10 (KI10 or KI10 processor) and the PDP-11 minicomputer (UNIBUS device). It also provides communications between processors and control. The MSM can configure up to four KI10 or KL10 processors and up to eight PDP-11's. Author

N83-33563# California Univ., Livermore. Lawrence Livermore Lab.
EXPERIENCE IN TRANSPORT PROTOCOL SPECIFICATION USING AN ALGORITHMIC LANGUAGE
Richard W. Watson May 1982 14 p refs Presented at the 2nd Intern. Workshop on Protocol Specification, Idyllwild, Calif., 17-20 May 1982
(Contract W-7405-eng-48)
(DE83-000736; UCRL-87464; CONF-82051281) Avail: NTIS HC A02/MF A01

Transport protocol specification using a combination of English for description and high level programming language (Pascal) for specifying legal protocol operation is discussed. The organization of a transport protocol specification using this approach is described. A model is used that isolates environmental details (e.g., operating system interface, buffer management, user interface) from the protocol algorithm. Therefore, the algorithm can be directly used in an implementation in any environment. DOE

N83-33564# Los Alamos Scientific Lab., N. Mex. Computing Div.
CONJUGATE GRADIENT PRECONDITIONERS FOR VECTOR AND PARALLEL PROCESSORS
Thomas L. Jordan 1983 14 p refs Presented at the Conf. on Elliptic Probl. Solvers, Monterey, Calif., 10 Jan. 1983
(Contract W-7405-eng-36)
(DE83-006068; LA-UR-83-272; CONF-830116-1) Avail: NTIS HC A02/MF A01

The conjugate gradient (CG) algorithm and some preconditioners for suitability on both vector and parallel computers are examined. Preconditioners considered include Jacobi, incomplete Cholesky, polynomial approximation, block Jacobi, and block cyclic reduction. Performance data on Cray-1 is provided for finite 5 and 9 point difference approximations to elliptic PDEs. Problems solved include the model problem (LaPlace's equation with Dirichlet boundary conditions) and a variable coefficient matrix. The variable elements are generated randomly such that the diagonal element of a row is the negative sum of the off-diagonal elements except for the boundary equations. In all cases, a 0 guess, a solution of 1 and a convergence criterion of .000001 error in the residual are used to start. DOE

N83-33565# California Univ., Livermore. Lawrence Livermore Lab.
FFP: FRIENDLY FORTRAN PROGRAMMING
B. McNamara and P. A. Willmann 17 Dec. 1982 66 p Presented at the 10th Conf. on Numerical Simulation of Plasmas, San Diego, Calif., 4-6 Jan. 1983
(Contract W-7405-eng-48)
(DE83-005445; UCRL-88387; CONF-830121-1) Avail: NTIS HC A04/MF A01

A Friendly FORTRAN Programming (FFP) system is described which has the following advantages: (1) it forces code to be structured; (2) it initializes the input-output media; (3) it sets up namelist input-output; (4) runs are automatically labelled; (5) TTY interrupts are routinely processed; (6) errors in namelist input typed from a terminal are trapped; (7) restarts are simple; (8) it is easy to get detailed timing information; (9) GRAFL-a simple, powerful graphics package is used; and (10) a control file is provided which

automates the retrieval and storage files, compilation, execution, printing, ploting, and the building of libraries. DOE

N83-33566# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.
HP-41c CALCULATOR PROGRAMS FOR FITTING OF DATA BY AN ANALYTICAL FUNCTION
Leo Brewer Dec. 1982 83 p refs
(Contract DE-AC03-76SF-00098)
(DE83-006441; LBL-15346) Avail: NTIS HC A05/MF A01

The general availability of programmable calculators and computers has signaled a shift from the tabular presentation of thermodynamic data to presentation in the form of analytical equations and the replacement of graphical methods of treating data by analytical methods. HP-65 and HP-67 calculator programs for a variety of thermodynamic calculations have been presented in two earlier reports. The present report lists programs for the HP-41c calculator which are of particular use in representing thermodynamic data in analytical form. DOE

N83-33567# Sandia Labs., Albuquerque, N. Mex.
THE FORTRAN/RT TUTORIAL: EIS, FIS AND FPU
R. Trelue and D. E. Ellis 1982 11 p refs Presented at Fall DECUS US Symp., Anaheim, Calif., 6 Dec. 1982
(Contract W-7405-eng-26)
(DE83-003421; SAND-82-2768C; CONF-821201-3) Avail: NTIS HC A02/MF A01

Extended instruction set (EIS), floating instruction set (FIS), floating point unit (FPU), and no hardware (NHD) are discussed. The hardware available to implement these additional arithmetic instruction sets is presented. Building the FORTRAN IV compiler and library to take maximum advantage of the hardware is discussed. Examples of threaded and inline code are given to how the output from the various types of FORTRAN compilers. The results of running five programs built for the different arithmetic options illustrate the advantages of additional arithmetic hardware. The tests were run on a LSI 11/2, a LSI 11/23 with both the KEF11-AA chip and the FPF11 processor, a PDP 11/34, and a PDP 11/45. DOE

N83-33568# Pacific Northwest Lab., Richland, Wash.
USING ACCESS PATH NAMES TO MODEL HIERARCHICAL STRUCTURES
R. J. Littlefield 1982 20 p refs Presented at the Very Large Data Base Conf., Mexico City, 8 Sep. 1982
(Contract DE-AC06-76RL-01830)
(DE83-003466; PNL-SA-10330; CONF-820984-1) Avail: NTIS HC A02/MF A01

The need to manipulate hierarchical structures arises in many application areas. A method of supporting high level structures like those of Pascal, Ada, and other languages is described. The structures do not require formal definition and can be modified incrementally. The method is based on a model of hierarchical data structures, that uses access paths as the names of structure components. Implementations based on the path name model are economical because no preprocessors are required and the structures can be built using existing data base management tools. A statistical analysis system is used for illustration. DOE

N83-33569# Pacific Northwest Lab., Richland, Wash.
INTERACTIVE COLOR GRAPHICS FOR MULTIVARIATE DATA
Wesley L. Nicholson and Richard J. Littlefield Sep. 1982 10 p refs Presented at the 14th Ann. Symp. on the Interface Rensselaer Polytechnic Inst. on Computer Sci. and Statistics, Troy, N.Y., 6 Jul. 1982
(Contract DE-AC06-76RL-01830)
(DE83-002690; PNL-SA-10070; CONF-820737-2) Avail: NTIS HC A02/MF A01

Meaningful display of data structure in more than two dimensions is a challenge to statistical graphics. The Analysis of Large Data Sets Project (ALDS) utilizes a VAX 11/780 and a RAMTEK 9400 high resolution color graphics display device to evaluate potential tools such as motion, glyphs and stereo 3D for display of pseudo higher dimensional data. Some of the ALDS research on the use of color and glyphs is described. Color is helpful but not essential. It is particularly useful for accent, for redundant expression of geometric cues and for identifying categories. Carefully selected color sets can display an ordered scale of a quantitative back variable. Glyphs can display quantitative back variables in a high dimensional scatterplot or summary statistics on back variables in each cell of a plot cellulated on two front variables. Examples illustrate the simultaneous use of color and glyphs in these two situations. A general purpose glyph description language (GDL) which is embedded in an expanded MINITAB statistics package, provides easy definition of arbitrary glyphs and flexible binding of glyph characteristics to back variables. DOE

N83-33570# Brookhaven National Lab., Upton, N. Y. Medical Dept.
SOFTWARE PROGRAMMABLE MULTI-MODE INTERFACE FOR NUCLEAR-MEDICAL IMAGING
I. G. Zubal, R. W. Rowe, Y. J. C. Bizais, G. W. Bennett, and A. B. Brill 1982 5 p refs Presented at the 1st IEEE Computer Soc. Intern. Conf. on Med. Computer Sci. Computational Med., Philadelphia, 23-25 Sep. 1982
(Contract DE-AC02-76CH-00016)
(DE83-000206; BNL-31837; CONF-820974-2) Avail: NTIS HC A02/MF A01

An innovative multi-port interface allows gamma camera events (spatial coordinates and energy) to be acquired concurrently with a sampling of physiological patient data. The versatility of the interface permits all conventional static, dynamic, and tomographic imaging modes, in addition to multi-hole coded aperture acquisition. The acquired list mode data may be analyzed or gated on the basis of various camera, isotopic, or physiological parameters. DOE

N83-33571# Los Alamos Scientific Lab., N. Mex.
ALECS: ASSEMBLY LANGUAGE EXTENSIONS AND CONTROL STRUCTURES
Michael A. Oothoudt and Thomas Kozlowski 1982 5 p refs Presented at the Fall DECUS US Symp., Anaheim, Calif., 6-9 Dec. 1982
(Contract W-7405-eng-36)
(DE83-003534; LA-UR-82-3334; CONF-821201-9) Avail: NTIS HC A02/MF A01

The ALECS system is an assembly language preprocessor allowing the use of structured programming techniques in MACRO-11 code. Programs are written using standard control structures with normal MACRO-11 code embedded as needed. The ALECS task is used to translate the source to pure MACRO-11 source file which is then submitted to the assembler. ALECS also produces a structured source listing showing the true logical flow of code. ALECS has been used for short subroutines as well as RSX-11M I/O drivers and an ACP. DOE

N83-33572# Pacific Northwest Lab., Richland, Wash.
USE OF COLOR AND MOTION FOR THE DISPLAY OF MULTI-DIMENSIONAL DATA
R. J. Littlefield and W. L. Nicholson Oct. 1982 11 p refs Presented at the DOE Statisical Symp., Idaho Falls, Idaho, 13 Oct. 1982
(Contract DE-AC06-76RL-01830)
(DE83-003596; PNL-SA-10897; CONF-821021-3) Avail: NTIS HC A02/MF A01

Meaningful display of data structure in more than two dimensions is a challenge to statistical graphics. The analysis of Large Data Sets project (ALDS) includes research to evaluate potential techniques for displaying higher-dimensional data. Some of the ALDS developments on the use of color, glyphs, motion and stereo are described. Color is helpful but not essential. Color can be used for accent, identification of categories, ordered-scale display of a quantitative variable, and reinforcement of geometric cues. Glyphs are useful for extending scatterplots to display additional quantitative variables. Motion is a powerful tool, not only for three dimensional (3-D) rotation, but also for more general display of

distinct images such as slices of a multi-dimensional solid. Stereo is a relatively weak 3-D cue when used by itself, but is useful as an adjunct to other cues such as rotation. Examples illustrate the simultaneous use of color, glyphs, motion, and/or stereo. DOE

N83-33573# California Univ., Livermore. Lawrence Livermore Lab.

DEVELOPMENT OF A MULTIMATERIAL, TWO-DIMENSIONAL, ARBITRARY LANGRANGIAN-EULERIAN MESH COMPUTER PROGRAM

Robert T. Barton 11 Oct. 1982 27 p refs Presented at the Numerical Astrophys. Meeting, Urbana, Israel, 21 Oct. 1982
(Contract W-7405-eng-48)
(DE83-004805; UCRL-88475; CONF-8210111) Avail: NTIS HC A03/MF A01

A large, multimaterial, two dimensional Arbitrary Lagrangian-Eulerian (ALE) computer program was developed. The special feature of an ALE mesh is that it can be either an embedded Lagrangian mesh, a fixed Eulerian mesh, or a partially embedded, partially remapped mesh. Remapping is used to remove Lagrangian mesh distortion. This general purpose program had been used for astrophysical modeling, under the guidance of James R. Wilson. The rationale behind the development of this program will be used to highlight several important issues in program design. DOE

N83-33574# Hanford Engineering Development Lab., Richland, Wash.

STANDARDS AND GUIDELINES APPLICABLE TO SCIENTIFIC SOFTWARE LIFE CYCLE

N. P. Wilburn Jan. 1983 108 p refs
(Contract DE-AC06-76FF-02170)
(DE83-010267; HEDL-TC-2314) Avail: NTIS HC A06/MF A01

A survey of 128 standards and guidelines is given and discussed as to their applicability in the development of scientific software. The coverage by the standard or guidelines of the four aspects (performance, documentation, verification, management) of each of the six phases of the software life cycle (requirements, design, implementation, testing, operation, maintenance) is identified. DOE

N83-33575# Sandia Labs., Albuquerque, N. Mex.

THE GRAPH: AN INTERACTIVE DIGITIZING AND PLOTTING PROGRAM

C. B. Selleck Mar. 1983 67 p refs
(Contract DE-AC04-76DP-00789)
(DE83-009702) Avail: NTIS HC A04/MF A01

GRAPH is an interactive program that allows the user to achieve two objectives. The first is digitizing graphs or plots to create data files of points. The second is the inverse of the first: plotting graphs from data files onto a graphics device. The program has extensive internal help and is designed to allow the user to get results quickly and easily. It is written in RATFOR and is intended for use on a VAX computer. The program provides graphical output through all of the Sandia Virtual Device Interface graphics devices. DOE

N83-33576# Sandia Labs., Albuquerque, N. Mex. Procurement Systems Design Div.

MANAGING SOFTWARE SYSTEMS FOR OPERATIONAL STABILITY

Bruce C. Dale 1983 22 p refs Presented at the IEEE Natl. Computer Conf., Anaheim, Calif., 16 May 1983
(Contract DE-AC04-76DP-00789)
(DE83-002555; SAND-82-2383C; CONF-830501-2) Avail: NTIS HC A02/MF A01

Operational stability in software systems is frequently unrealized. This failure, when experienced over the long term, is likely to be the manifestation of environmental rather than programmatic destabilizing factors. Persons addressing the problem should possess managerial as well as technical skills, and must broaden their approach to include improvements in organizational and functional controls as well as in software. Effective organizational controls create a first line of defense for all system problems in the Operations group, and the applications software teams function in a support capacity. Effective functional controls restrict software maintenance teams to defined tasks, and prevent their assumption by default of responsibilities which should be procedural vehicles can be helpful in supporting and controlling functional responsibilities. DOE

N83-33577# California Univ., Livermore. Lawrence Livermore Lab.

COMPUTER-AIDED ENGINEERING IN NESD

H. S. Ames 13 Apr. 1983 28 p refs
(Contract W-7405-eng-48)
(DE83-011260; UCID-19779) Avail: NTIS HC A03/MF A01

The present capabilities of the NESD computer aided engineering (CAE) system are described and immediate and long range development plans are discussed. The goal of CAE is to help engineers improve their productivity by using computers. The use of computers in engineering is certainly not new, but the widespread availability of computer resources will allow engineers to utilize computers for all facts of their work, including modeling and analyses, design, documentation, project management, software development, and communications. DOE

N83-33578# Bendix Corp., Kansas City, Mo.

SOFTWARE QUALITY ASSURANCE

S. D. Moody Mar. 1983 22 p refs
(Contract DE-AC04-76DP-00613)
(DE83-010520; BDX-613-2941) Avail: NTIS HC A02/MF A01

The merits of software quality assurance practices over the entire life cycle of the software product can be summarized as follows: more reliable product, lower life cycle costs, early exposure of life cycle inconsistencies, and early exposure of design errors. A guideline for the development of a software quality assurance program was drafted. Topics critical to the development of a software quality assurance program are discussed. DOE

N83-33579# General Atomic Co., San Diego, Calif.

STRUCTURED MULTI-STREAM COMMAND LANGUAGE

A. S. Glad Dec. 1982 18 p ref Presented at the 8th Am. Ann. Muse Meeting, Fort Lauderdale, Fla., 5-10 Dec. 1982
(Contract DE-AT03-76ET-51011)
(DE83-011883; GA-A-16890) Avail: NTIS HC A02/MF A01

A multi-stream command language was implemented to provide the sequential and decision-making operations necessary to run the neutral-beam ion sources connected to the Doublet III Tokamak fusion device. The multi-stream command language was implemented in Pascal on a Classic 7870 running under MAX IV. A brief description of the programs comprising the command language including the operating system interaction; a description of the language syntax and commands necessary to develop a procedure stream; and a description of the normal operating procedures for executing either the sequential or interactive streams are given. DOE

N83-33580# Forschungsinstitut der Deutschen Bundespost, Darmstadt (West Germany).

EQUIPMENT FOR QUICK-LOOK EVALUATION OF MEASURED BIT ERROR STRUCTURES

Werner Herzog Dec. 1982 43 p refs In GERMAN; ENGLISH summary
(FI-44-TBr-90) Avail: NTIS HC A03/MF A01

A mobile equipment that allows error structure evaluation at the measuring location to be performed independently of the local computer is presented. Its prime task is to bring the tape punched measurement results into a form suitable for quick initial evaluation. The measured bit error structures are represented chronologically on a visual display unit either as a sequence of digits or as lines of different length. Additional information on the location of error events facilitates their incorporation into the overall measurement. These data form the basis for the quick-look evaluation, whose aim is to trace possible systematics inherent in bit error structures. Author (ESA)

N83-33581# Forschungsinstitut fuer Informationsverarbeitung, Karlsruhe (West Germany).
STANDARD IMAGE PROCESSING METHODS. PART 1: PROGRAM SYSTEM FOR REALIZATION AND EVALUATION [STANDARDMETHODEN DER BILDVERARBEITUNG. TEIL 1: PROGRAMMSYSTEM ZUR REALISIERUNG UND BEWERTUNG]
Udo Schlifkowitz, Georg Hofele, and Helmut Kazmierczak Bonn Bundesministerium der Verteidigung 1982 86 p refs In GERMAN
(BMVg-FBWT-82-10-Pt-1) Avail: NTIS HC A05/MF A01; DOK-ZENTBw, Bonn DM 30

A general flexible program system was implemented for standard image processing. It contains processing modules based on matrix transformations and is designed so that new standard algorithms can be realized in a short time and with little expense of program development. The system handles sequences of selectable processing steps with variable window size and data format. The system includes the standard methods for local image processing, for linear, and elementary nonlinear image transformations. It evaluates image transformations. The most important programs are given. Author (ESA)

N83-33582# Graz Univ. (Austria). Inst. of Image Processing and Computer Graphics.
SEGMENTATION OF DIGITAL IMAGES USING A PRIORI INFORMATION ABOUT THE EXPECTED IMAGE CONTENTS
Walter Kropatsch 1982 26 p refs
Avail: NTIS HC A03/MF A01

A concept of segmenting a given image is presented, which allows the use of different segmentation algorithms, using an a priori description of the expected image to guide the segmentation and interpretation process. This looks first for locations of the image where more than two regions meet. Small portions around these locations are then segmented by regional algorithms. Complete segmentation is performed only for small windows where more than two regions are expected to meet each other. In the rest of the image the boundaries can be found by line detection algorithms if start and endpoint of the line are known as edges in already segmented windows and the two adjacent regions of the line have known properties. Only pixels of interest for the expected result are inspected. Segmentation of subwindows and searching for different boundaries can be done in parallel. Author (ESA)

N83-32725# Air Force Systems Command, Wright-Patterson AFB, Ohio.
AN EXPERIMENTAL INTERACTIVE COMPUTER GRAPHICS SYSTEM FOR FREE-FORM SURFACE DESIGN
Zheng Huiling, Wang Zhisheng, Lu Hongjia, and He Tianbao *In its* Acta Aeron. et Astronautica Sinica (FTD-ID(RS)T-1605-82) 4 Mar. 1983 p 138-150a refs Transl. into ENGLISH from Hang Kong Xuebao (China), v. 3, no. 3, Sep. 1982 p 88-95 (For primary document see N83-32717 21-01)
Avail: NTIS HC A08/MF A01 CSCL 09/2

N83-33260# Academy of Sciences (USSR), Moscow.
TWO PROGRAMS FOR QUANTITATIVE ANALYSIS OF THE DATA OF GEOBOTANICAL MAPPING FOR NEEDS OF MONITORING
A. S. Kondrashov and V. G. Oniptchenko *In its* Geosystem Studies for Monitoring 1981 p 173-181 In RUSSIAN; ENGLISH summary (For primary document see N83-33238 21-42)
Avail: NTIS HC A09/MF A01

N83-33293# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
SOME QUESTIONS ABOUT THE EVALUATION BY COMPUTER [EINIGE FRAGEN IM ZUSAMMENHANG MIT DER RECHNERISCHEN AUSWERTUNG]
P. Meissl *In its* The German-Austrian Doppler Campaign 1982 p 61-66 ref In GERMAN (For primary document see N83-33288 21-43)
Avail: NTIS HC A07/MF A01

N83-33492# Meteorological Satellite Center, Tokyo (Japan).
DEVELOPMENT OF COMPUTER PROGRAMS FOR VISSR CALIBRATION DATA ARCHIVING AND EDITING
Masami Tokuno and Tatekatu Yoshida *In its* Meteorol. Satellite Center Tech. Note., No. 7, 1983 Mar. 1983 p 73-78 refs In JAPANESE; ENGLISH summary (For primary document see N83-33485 21-47)
Avail: NTIS HC A06/MF A01

62 COMPUTER SYSTEMS

Includes computer networks.

N83-33583*# Kentron Technical Center, Hampton, Va.
DBPQL: A VIEW-ORIENTED QUERY LANGUAGE FOR THE INTEL DATA BASE PROCESSOR Final Report
Paul A. Fishwick Jul. 1983 55 p refs
(Contract NAS1-16000)
(NASA-CR-172191; NAS 1.26:172191) Avail: NTIS HC A04/MF A01 CSCL 09B

An interactive query language (BDPQL) for the Intel Data Base Processor (DBP) is defined. DBPQL includes a parser generator package which permits the analyst to easily create and manipulate the query statement syntax and semantics. The prototype language, DBPQL, includes trace and performance commands to aid the analyst when implementing new commands and analyzing the execution characteristics of the DBP. The DBPQL grammar file and associated key procedures are included as an appendix to this report. Author

N83-33584# Du Pont de Nemours (E. I.) and Co., Aiken, S.C.
SAVANNAH RIVER LABORATORY LOCAL AREA COMPUTER NETWORK
Andrew J. Johnson 1982 11 p refs Presented at the DOE Mini/Microcomputer Information Interchange Conf., Los Alamos, N. Mex., 3-5 Nov. 1982
(Contract DE-AC09-76SR-00001)
(DE83-004918; DP-MS-82-48; CONF-821157-1) Avail: NTIS HC A02/MF A01

The Savannah River Laboratory (SRL) has been using minicomputers and microcomputers for nearly twenty years to support the research and development needs of the site. There are currently in use at SRL over sixty of these systems providing experimental data acquisition, runtime control, runtime and postrun analysis, data archiving, and reporting services for individual experiments. More recently, many personal computers have been acquired for desk top computing by SRL's professionals. The various laboratory and personal computers range in size from the 32-bit super minicomputers to dedicated, 8-bit single-board computers. A local area network (LAN) has been defined to support this environment. The major components of the LAN are defined to be the data acquisition and personal computers, larger computer systems for data analysis and peripheral support, and a high-speed, baseband local communications bus. DOE

N83-33585# California Univ., Berkeley. Lawrence Berkeley Lab. Engineering and Technical Services Div.
CONTROLLING A RADIALLY-CONNECTED ARRAY OF MINICOMPUTERS
John Meng May 1982 6 p refs Presented at the 16th Asilomar Conf. on Circuits, Systems, and Computers, Pacific Grove, Calif., 8-10 Nov. 1982
(Contract DE-AC03-76SF-00098)
(DE83-003984; LBL-14471; CONF-821105-6) Avail: NTIS HC A02/MF A01

To connect a radial array of eight minicomputers to a single master minicomputer, front panel controls were simulated in which switch contacts are electronically made or broken under program control in the master, and data is returned to the master via what normally would be register displays. Experience so far indicates

that this means of connecting to an array of minicomputers has many powerful advantages over other more conventional computer array control schemes. DOE

N83-33586# One America, Inc., Washington, D.C.
ADP REQUIREMENTS STUDY REPORT. VOLUME 5: PROCUREMENT SPECIFICATIONS STATEMENT
30 Sep. 1982 46 p Prepared in cooperation with Cap Gemini, Inc., Vienna, Va. 5 Vol.
(Contract DE-AC01-81EI-11865)
(DE83-007948; DOE/EI-11865/T1-Vol-5) Avail: NTIS HC A03/MF A01

This document contains an update of the previously prepared functional specifications based on the revised requirements statement which was prepared. As a result of the study effort, it was determined that the current EIA data processing configuration will satisfy projected requirements through FY 1985. Based on this fact coupled with uncertainty in DOE's organizational structure and projected conversion impacts, it is recommended that EIA attempt to extend GSA authorization of the current configuration. However, this specification has been prepared to support EIA acquisition efforts if GSA approval for continuation of existing operations cannot be obtained. The specification is written to allow for a free and open competitive procurement in accordance with GSA guidelines. DOE

63 CYBERNETICS

Includes feedback and control theory.

For related information see also *54 Man/System Technology and Life Support.*

N83-33587# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
PERFECT CODES HARDLY EXIST
M. R. Best 15 Mar. 1982 12 p refs Presented at Inform. Theory Meeting, Oberwolfach, West Germany, 4-10 Apr. 1982 Submitted for publication
(NLR-MP-82013-U) Avail: NTIS HC A02/MF A01

A partial proof of the perfect code theorem is summarized. The relevant part refers to the nonexistence of unknown t-perfect codes over arbitrary alphabets for t is not a member of the set (1, 2, 6, 8). Author (ESA)

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N83-33588 Royal Aircraft Establishment, Farnborough (England). Aerodynamics Dept.
A CURVE-FITTING METHOD FOR THE ANALYSIS OF DATA OBEYING AN ASSUMED ANALYTIC RELATIONSHIP
J. S. Smith 22 Feb. 1983 19 p refs
(RAE-TM-AERO-1961; BR87646) Copyright. Avail: Issuing Activity

A simple curve fitting method for data which obeys an assumed analytic relationship, but in which an unknown error or offset is present in the independent variable is described. An iterative process is used to find the error, using linear regression to control the iterations and to determine the unknown constants. The method is used to calibrate accelerometers and to analyze drag measurements. Author (ESA)

N83-33589*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DIFFERENCE EQUATION STATE APPROXIMATIONS FOR NONLINEAR HEREDITARY CONTROL PROBLEMS
I. G. Rosen (Bowdoin Coll.) 30 Jun. 1982 52 p refs
(Contracts NAS1-15810; NAS1-16394; DAAG29-79-C-0161; Grants AF-AFOSR-3092-76; NSF MCS-79-05774)
(NASA-CR-172785; ICASE-82-16; NAS 1.26:172785) Avail: NTIS HC A04/MF A01 CSCL 12A

Discrete approximation schemes for the solution of nonlinear hereditary control problems are constructed. The methods involve approximation by a sequence of optimal control problems in which the original infinite dimensional state equation has been approximated by a finite dimensional discrete difference equation. Convergence of the state approximations is argued using linear semigroup theory and is then used to demonstrate that solutions to the approximating optimal control problems in some sense approximate solutions to the original control problem. Two schemes, one based upon piecewise constant approximation, and the other involving spline functions are discussed. Numerical results are presented, analyzed and used to compare the schemes to other available approximation methods for the solution of hereditary control problems. M.G.

N83-33590*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SPLINE APPROXIMATIONS FOR NONLINEAR HEREDITARY CONTROL SYSTEMS
P. L. Daniel (Southern Methodist Univ.) 28 Apr. 1982 54 p refs
(Contracts NAS1-15810; NAS1-16394; DAAG29-79-C-0161; Grants AF-AFOSR-3092-76; NSF MCS-79-05774-05)
(NASA-CR-172784; ICASE-82-10; NAS 1.26:172784) Avail: NTIS HC A04/MF A01 CSCL 12A

A sline-based approximation scheme is discussed for optimal control problems governed by nonlinear nonautonomous delay differential equations. The approximating framework reduces the original control problem to a sequence of optimization problems governed by ordinary differential equations. Convergence proofs, which appeal directly to dissipative-type estimates for the underlying nonlinear operator, are given and numerical findings are summarized. M.G.

N83-33591*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
RADIATION OF SOUND FROM UNFLANGED CYLINDRICAL DUCTS
S. L. Hartharan and Alvin Bayliss (Exxon Corp. Research, Linden, N.J.) Jul. 1983 30 p refs
(Contracts NAS1-17070; DE-AC02-76ER-03077; Grant AF-AFOSR-0020-81)
(NASA-CR-172171; NAS 1.26:172171) Avail: NTIS HC A03/MF A01 CSCL 12A

Calculations of sound radiated from unflanged cylindrical ducts are presented. The numerical simulation models the problem of an aero-engine inlet. The time dependent linearized Euler equations are solved from a state of rest until a harmonic solution is attained. A fourth order accurate finite difference scheme is used and solutions are obtained from a fully vectorized Cyber-203 computer program. Cases of both plane waves and spin modes are treated. Spin modes model the sound generated by a turbofan engine. Boundary conditions for both plane waves and spin modes are treated. Solutions obtained are compared with experiments conducted at NASA Langley Research Center. M.G.

N83-33592*# National Aeronautics and Space Administration, Washington, D. C.
A PROVISIONAL EFFECTIVE EVALUATION WHEN ERRORS ARE PRESENT IN INDEPENDENT VARIABLES
L. S. Gurin May 1983 23 p refs Transl. into ENGLISH of "Uslovno-effektivnoye Otsenivaniye pre Nalichii Oshibok v Nezavisimykh Peremennykh" rept Pr-753, 1982 22 p Transl. by Scientific Translation Service, Santa Barbara, Calif. Original doc. prep. by Inst. of Space Research, Academy of Sciences (USSR), Moscow
(Contract NASw-3542)
(NASA-TM-77211; NAS 1.15:77211; Pr-753) Avail: NTIS HC A02/MF A01 CSCL 12A

Algorithms are examined for evaluating the parameters of a regression model when there are errors in the independent variables. The algorithms are fast and the estimates they yield

are stable with respect to the correlation of errors and measurements of both the dependent variable and the independent variables. Author

N83-33593# Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.
OVERSPECIFIED NORMAL EQUATIONS FOR SPECTRAL ESTIMATION M.S. Thesis
David Izraelevitz Jun. 1983 74 p refs
(Contract N0014-81-K-0742; Grant NSF ECS-80-07102; NR Proj. 049-506)
(AD-A128278; TR-498) Avail: NTIS HC A04/MF A01 CSCL 12/1

There is one-to-one relationship between a set of P normalized positive definite correlation estimates and the P predictor coefficients derived using autoregressive modeling. Several researchers have proposed the use of M greater than P corrrelation estimates to provide a better Pth order model. Specifically, the normal equations are augmented to provide M linear equations between the correlation estimates and the predictor coefficients. Since the system of equations is now overspecified, a least squares solution is required. In this thesis a study is presented of some of the properties of the method of overspecified normal equations as applied to the problem of spectral estimation. The main contribution of this thesis is the derivation of the relationships between the number of correlations used, the model order and the signal to noise ratio of the signal, to the characteristics of the resulting spectral estimate. The characteristics studied are the spectral height, bandwidth and area. The method is shown to be a spectral density estimator like the ME method, where spectral areas rather than spectral values should be interpreted as estimates of power. GRA

N83-33594# Cranfield Inst. of Tech., Bedfordshire (England). Dept. of Mathematics.
THE WHITTAKER-KOTELNIKOV-SHANNON SAMPLING EXPANSION AND SOME GENERALIZATIONS, PARTS 1 AND 2
R. F. Hoskins and J. Sousa Pinto Jun. 1983 28 p refs
(Rept-8301; ISBN-0-902937-81-2) Avail: NTIS HC A03/MF A01

Generalized forms of expansion are examined. Author

N83-33595# Sandia Labs., Albuquerque, N. Mex.
ANALYSIS AND ELIMINATION OF THE DISCRETE-ORDINATES FLUX DIP
J. E. Morel and G. R. Montry 1983 16 p refs Presented at the Am. Nucl. Soc. Topical Conf. on Computational Methods, Salt Lake City, 28 Mar. 1983
(Contract DE-AC04-76DP-00789)
(DE83-004114; SAND-82-2850C; CONF-830304-5) Avail: NTIS HC A02/MF A01

A theoretical analysis is presented for the discrete-ordinates flux dip in one dimensional spherical geometry. It is found that the flux dip is due to an inconsistency between the discrete-ordinates equations (in the diffusion limit) and the diffusion equation. It is theoretically shown that this inconsistency (and hence the flux dip) can be completely eliminated through the use of simple angular weighted-diamond difference scheme. Computational results are given which confirm the theoretical analysis. The technique was extended to one dimensional cylindrical geometry and was found to be equally effective. Extensions to multi-dimensional geometrics appear to be straightforward. DOE

N83-33596# Los Alamos Scientific Lab., N. Mex.
DIFFUSION-SYNTHETIC ACCELERATION METHODS FOR THE DISCRETE-ORDINATES EQUATIONS
Edward W. Larsen 1983 21 p refs Presented at the Am. Nucl. Soc. Math. and Computation Div. Topical Meeting Advan. in Reactor Computations, Salt Lake City, 28-31 Mar. 1983
(Contract W-7405-eng-36)
(DE83-004738; LA-UR-82-3581; CONF-830304-10) Avail: NTIS HC A02/MF A01

The diffusion-synthetic acceleration (DSA) method is an iterative procedure for obtaining numerical solutions of discrete-ordinates problems. The DSA method is operationally more complicated than the standard sourceiteration (SI) method, but if encoded properly it converges much more rapidly, especially for problems with diffusion-like regions. The basic ideas behind the DSA method are described and a (roughly chronological) review of its long development is given. Additional topics, including some remaining open problems and the status of current efforts aimed at solving these problems, are also addressed. DOE

N83-33597# Los Alamos Scientific Lab., N. Mex.
EFFICIENT METHODS FOR TIME-ABSORPTION (ALPHA) EIGENVALUE CALCULATIONS
Thomas R. Hill 1983 14 p refs Presented at the Am. Nucl. Soc. Topical Conf. on Computational Methods, Salt Lake City, 28-31 Mar. 1983
(Contract W-7405-eng-36)
(DE83-004809; LA-UR-82-3594; CONF-830304-7) Avail: NTIS HC A02/MF A01

The time-absorption eigenvalue (a) calculation is one of the options found in most discrete-ordinates transprt codes. Several methods have been developed at Los Alamos to improve the efficiency of this calculation. Two procedures, based on coarse-mesh rebalance, to accelerate the a eigenvalue search are derived. A hybrid scheme to automatically choose the more effective rebalance method is described. The a rebalance scheme permits some simple modifications to the iteration strategy that eliminates many unnecessary calculations required in the standard search procedure. For several fast supercritical test problems, these methods resulted in convergence with one-fifth the number of iterations required for the conventional eigenvalue search procedure. DOE

N83-33598# California Univ., Livermore. Lawrence Livermore Lab.
MODE SHAPES OF THIN MEMBRANES VIA CONFORMAL MAPPING TECHNIQUES
H. Joseph Weaver 1 Nov. 1982 50 p
(Contract W-7405-eng-48)
(DE83-006566; UCID-19618) Avail: NTIS HC A03/MF A01

This paper presents a simple technique by which the mode shapes of membranes of various geometries can be obtained. The method is based on using conformal mapping to transform a rectangular region in the z plane to another geometric region in the w plane. The mode shapes of a membrane possessing this new geometry are then obtained by multiplying the simple formula describing the rectangular case by a two dimensional scaling function. This scaling function is obtained by differentiation of the conformal mapping formulas. DOE

N83-33599# Los Alamos Scientific Lab., N. Mex.
TLC SCHEME FOR NUMERICAL SOLUTION OF THE TRANSPORT EQUATION ON EQUILATERAL TRIANGULAR MESHES
Wallace F. Walters 1983 16 p refs Presented at the Am. Nucl. Soc. Topical Conf. on Computational Methods, Salt Lake City, 28 - 31 Mar. 1983
(Contract W-7405-eng-36)
(DE83-004745; LA-UR-82-3671; CONF-830304-12) Avail: NTIS HC A02/MF A01

A new triangular linear characteristic TLC scheme for numerically solving the transport equation on equilateral triangular meshes has been developed. This scheme uses the analytic solution of the transport equation in the triangle as its basis. The data on edges of the triangle are assumed linear as is the source representation. A characteristic approach or nodal approach is used to obtain the analytic solution. Test problems indicate that the new TLC is superior to the widely used DITRI scheme for accuracy. DOE

N83-33600# Sandia Labs., Albuquerque, N. Mex.
CASCADE STRUCTURE FOR EQUATION ERROR MINIMIZATION
R. A. David 1982 5 p refs Presented at Asilomar Conf., Pacific Grove, Calif., 8 Nov. 1982

(Contract DE-AC04-76DP-00789)
(DE83-003365; SAND-82-2745C; CONF-821105-5) Avail: NTIS HC A02/MF A01

There are several obstacles which must be overcome before infinite impulse response (IIR) adaptive algorithms will be practical for real time signal processing applications. Two primary concerns are stability and potentially multi-modal performance surfaces. An adaptive algorithm which addresses both of these problems is introduced. Using the equation error structure, an IIR adaptive transfer function is obtained. The polynomial which generates system poles is realized as a series of second order sections in cascade. The performance of this algorithm is compared to that of other IIR adaptive structures. DOE

N83-33601# Illinois Univ., Urbana. Dept. of Computer Science.
ROOT FINDING IN SIMULATION AND ODE SOLUTION
C. W. Gear Dec. 1982 12 p refs
(Contract DE-AC02-76ER-02383)
(DE83-010995; UIUCDCS-R-82-1116; UILU-ENG-82-1743; COO-2383-0091) Avail: NTIS HC A02/MF A01

A simple implementation of an interpolation scheme for detecting a zero crossing of a sequence of function values is described. This has applications in continuous simulation and other situations involving integration in which a discontinuity or termination is triggered by the change of sign of a switching function and it is necessary to determine a close approximation to the value of time at which this change occurs. This technique has been coded in FORTRAN. DOE

N83-33602# Sandia Labs., Albuquerque, N. Mex. Numerical Mathematics Div.
GLOBAL ERROR ESTIMATES FOR ODES BASED ON EXTRAPOLATION METHODS
Lawrence F. Shampine and Lorraine S. Baca Mar. 1983 30 p refs
(Contract DE-AC04-76DP-00789)
(DE83-010415; SAND-83-0515) Avail: NTIS HC A03/MF A01

It is shown how to exploit the powerful codes based on extrapolation of the midpoint rule so as to solve the initial value problem for a systems of ordinary differential equations (ODEs) and to provide estimates of the global (true) error in the solution values. Particular attention is given to the reliability of the estimates and to the overall efficiency of the integration. DOE

N83-33603# Sandia Labs., Albuquerque, N. Mex. Numerical Mathematics Div.
COMBINATORIAL OPTIMIZATION WITH BOOLEAN CONSTRAINTS
Bernie L. Hulme and Richard B. Worrell Feb. 1983 24 p refs
(Contract DE-AC04-76DP-00789)
(DE83-010387; SAND-83-0085) Avail: NTIS HC A02/MF A01

It is shown how Boolean algebraic formula manipulation can be used to solve certain kinds of optimization problems. If the problem can be formulated in terms of 0 to 1 variables and if the feasible solutions can be described by a Boolean equation, then the method can be used. The method generates feasible solutions algebraically as terms of a disjunctive normal form of a Boolean function. Many small sample problems are solved to illustrate the method and the practical situations in which these optimization problems arise. DOE

N83-33604# Oak Ridge National Lab., Tenn. Mathematics and Statistics Research Dept.
NUMERICAL METHODS FOR LARGE SPARSE LINEAR LEAST-SQUARED PROBLEMS
Michaél T. Heath Apr. 1983 23 p refs Sponsored in part by NOAA
(Contract W-7405-eng-26)
(DE83-011062; ORNL/CSD-114) Avail: NTIS HC A02/MF A01

Large sparse least squares problems arise in many applications, including geodetic network adjustments and finite element structural analysis. Although geodesists and engineers have been solving such problems for years, it is only relatively recently that numerical analysts have turned attention to them. A survey of numerical methods for large sparse linear least squares problems is presented focusing mainly on developments since the last comprehensive surveys of the subject published in 1976. Direct methods based on elimination and on orthogonalization, as well as various interative methods are considered. The ramifications of rank deficiency, constraints, and updating are also discussed. DOE

N83-33605# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Pure Mathematics.
A CHARACTERIZATION OF TWO CLASSES OF SEMI PARTIAL GEOMETRIES BY THEIR PARAMETERS
H. A. Wilbrink and A. E. Brouwer Aug. 1982 16 p refs Submitted for publication
(MC-ZW-175/82) Avail: NTIS HC A02/MF A01

Semipartial geometries were characterized by their parameters mu and alpha. Two classes of semipartial geometries are considered, one with mu = alpha squared and one with mu = alfa x (alfa + 1). Theorems and lemmas are proved for each geometry. It is shown that, under mild restrictions on the parameters, these two geometries are determined by their parameters. Author (ESA)

N83-33606# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Pure Mathematics.
THE STRUCTURE OF NEAR POLYGONS WITH QUADS
A. E. Brouwer and H. A. Wilbrink Nov. 1982 42 p refs Submitted for publication
(MC-ZW-177/82) Avail: NTIS HC A03/MF A01

A structure theory for near polygons with quads was developed. Lemmas are proved for thick near polygons and for thin near polygons with parameters (s, t2, t3..., td) and diameter d. It is shown that, if a thick near polygon has quads, it contains sub 2j-gons for 2 equal to or $<$j equal, to or $<$d. Using inequalities obtained by eigenvalue techniques and by structural considerations, it is proved that there are only very few possibilities for the parameter set of a regular near polygon. Regular sporadic 2d-gons do not exist for d equal to or $>$4 with 5$>$1 and t2$<$1, and t3 different from t2 x (t2 + 1). Author (ESA)

N83-33607# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Pure Mathematics.
A CHARACTERIZATION OF A GEOMETRY RELATED TO OMEGA + 2n(K)
Bruce N. Cooperstein (California Univ., Santa Cruz) 1982 26 p refs Sponsored in part by NSF
(MC-ZW-178/82) Avail: NTIS HC A03/MF A01

Halved dual polar spaces were characterized as incidence structures. Vector space of dimension 2n equal to or $>$8 over a field K equipped with a nondegenerate quadratic form with maximal Witt index is considered. It is shown that the halved dual polar spaces related to omega +2n(K) are characterized as incidence structures in terms of a short list of axioms on points and lines. Author (ESA)

N83-33608# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Applied Mathematics.
UNIFORM ASYMPTOTIC EXPANSIONS OF LAPLACE INTEGRALS
N. M. Temme Jun. 1982 33 p refs Submitted for publication
(MC-TW-224/82) Avail: NTIS HC A03/MF A01

Three different, although related expansions of a Laplace integral were studied. The expansions are uniformly valid with respect to the saddle point in an unbounded domain, containing the point mu equals zero (mu is the uniformity parameter). The asymptotic nature of the uniform expansions is discussed and error bounds are given for the remainders in the expansions. Analog expansions are given for a loop integral. A simple example is considered, giving expansions for the exponential integral. Further applications are given for Whittaker functions and the Riemann zeta function. The expansions can be viewed as uniform versions of the expansions obtained by Watson's lemma. Author (ESA)

N83-33609# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Applied Mathematics.
ENTIRE FUNCTIONS FOR THE LOGISTIC MAP 1
H. A. Lauwerier Nov. 1982 34 p refs
(MC-TW-228/82) Avail: NTIS HC A03/MF A01

A class of entire functions satisfying a functional equation of the logistic type is introduced. It is shown that results obtained with simple iterated maps such as the logistic difference equation have their counterpart in the asymptotic behavior of certain entire functions in the complex plane. The structure of the zero set of these functions and their behavior on the positive real axis are analyzed. Computer plots of the zeros reveal phenomena that can be understood by a perturbation analysis in the chaotic regime. Author (ESA)

N83-33610# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Computer Science.
FACTORING MULTIVARIATE POLYNOMIALS OVER FINITE FIELDS
A. K. Lenstra Feb. 1983 26 p refs Submitted for publication
(MC-IW-221/83) Avail: NTIS HC A03/MF A01

An algorithm for the factorization of multivariate polynomials with coefficients in a finite field is given. The algorithm is polynomial-time in the degrees of the polynomial to be factored. A reduction algorithm for lattices over the polynomials, with coefficients in the finite field containing q elements, q power of some prime p, is used. The technique is to reduce the polynomial to one in two variables only by substituting powers of one variable into the others, and then working module the principal ideal generated by the powers of an irreducible polynomial in one variable. Author (ESA)

N83-33611# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Computer Science.
A PROCESS ALGEBRA FOR THE OPERATIONAL SEMANTICS OF STATIC DATA FLOW NETWORKS
J. A. Bergstra and J. W. Kplop Feb. 1983 22 p refs Submitted for publication
(MC-IW-222/83) Avail: NTIS HC A02/MF A01

An algebra of communicating processes is used to provide an operational semantics of data flow networks with a static number of nodes and channels. A data flow network is modeled as a system of processes communicating by hand shaking. Nodes and channels are treated on equal footing: in both cases their semantics are derived as the solution of a fixed point equation in the process algebra. Author (ESA)

N83-33612# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Computer Science.
PC-COMPACTNESS, A NECESSARY CONDITION FOR THE EXISTENCE OF SOUND AND COMPLETE LOGICS OF PARTIAL CORRECTNESS
J. A. Bergstra and J. Tiuryn (Warsaw Univ.) Mar. 1983 14 p refs Submitted for publication
(MC-IW-223/83) Avail: NTIS HC A02/MF A01

If a structure has a complete Hoare's logic then its first-order theory must be PC-compact (each asserted program true in all of its models is already implied by a finite subset of the theory); moreover its partial correctness theory must be decidable relative to this first-order theory. An example is given of a structure statisfying both conditions, on which Hoare's logic is incomplete but which does possess a sound and complete logic of partial correctness. Transformation of two-sorted structures into single-sorted ones is used. Author (ESA)

N83-33613# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Computer Science.
ANOTHER INCOMPLETENESS THEOREM FOR HOARE'S LOGIC
J. A. Bergstra, A. Cmielienska (Torun Univ.), and J. Tiuryn (Warsaw Univ.) Mar. 1983 17 p refs Submitted for publication Sponsored in part by IBM Corp.
(Grant NSF MCS-80-10707)
(MC-IW-224/83) Avail: NTIS HC A02/MF A01

Given a first-order structure A, there exists a structure B such that the some C of A and B satisfies the following property: the set of partial correctness assertions true over C is recursive in the theory of C but Hoare's logic is not complete for C. Reductions of partial correctness assertions over C to those over B (by showing an effective simulation of computations on C by those on B), interpretation of partial correctness in A by the same over C, showing incompleteness of Hoare logic over A to imply that of the same over C, and normalization of the consequent formula are outlined. Author (ESA)

N83-33614# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Computer Science.
AN OPTIMAL SIMULATION OF COUNTER MACHINES: THE AUGMENTED COUNTER MACHINE (ACM) CASE
Paul M. B. Vitanyi Mar. 1983 10 p refs Submitted for publication
(MC-IW-225/83) Avail: NTIS HC A02/MF A01

The augmented counter machine (ACM), a multicounter machines, with initially nonzero counters allowed, and the additional one-step instruction "set counter i to the value of counter j", for any pair of counters i and j is introduced. It is shown that each ACM can be real time simulated by an oblivious one-head tape unit using the information-theoretical storage optimum. For each step $t > \text{or} = 0$, and each interval of n steps $> \text{or} = 1$, during the processing of the $(t+1)$-th through $(t+n)$-th input command, of the simulated ACM, the storage head of the simulating tape unit accesses only $0(\log n)$ distinct tape squares. Author (ESA)

N83-33615# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
BOUNDARY VALUE TECHNIQUES FOR INITIAL VALUE PROBLEMS IN ORDINARY DIFFERENTIAL EQUATIONS
A. O. H. Axelsson (Catholic Univ. of Nijmegen, Netherlands) and J. G. Verwer Jan. 1983 39 p refs Submitted for publication
(MC-NW-147/83) Avail: NTIS HC A03/MF A01

The numerical solution of initial value problems in ordinary differential equations by boundary value techniques is considered. Finite difference formulas due to Fox, and Fox and Mitchell, and a variational method due to Galerkin are used. It is concluded that the global method is a robust reliable method for stiff systems and systems with increasing fundamental solutions. It is particularly efficient when moderate accuracy is desired. It is not very sensitive to stiffness. In the case of high accuracy, large or nonlinear systems, efficiency depends on the availability of good algebraic solvers. Author (ESA)

N83-33616# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
THE MULTIGRID METHOD IN THE SOLUTION OF TIME-DEPENDENT NONLINEAR PARTIAL DIFFERENTIAL EQUATIONS
H. B. deVries Feb. 1983 32 p refs Submitted for publication
(MC-NW-148/83) Avail: NTIS HC A03/MF A01

The numerical solution of nonlinear time-dependent partial differential equations is discussed. By the method of lines such a partial differential equation is converted into a system of ordinary differential equations to which an implicit linear multistep method is applied. Using Newton iteration the nonlinear implicit relations are replaced by a sequence of linear equations. These linear equations are solved by the iterative use of a multilevel algorithm. Numerical examples are given and a comparison is made with other integration techniques. Author (ESA)

N83-33617# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
STABILITY RESULTS FOR DISCRETE VOLTERRA EQUATIONS
P. J. vanderHouwen Mar. 1983 29 p refs Submitted for publication
(MC-NW-149/83) Avail: NTIS HC A03/MF A01

Stability results are presented for a general class of linear

multistep methods for Volterra equations. The results are obtained by deriving a recurrence relation of finite length for the discrete Volterra equations. The results are illustrated by a numerical example. Results which do not use finite recurrence relations are mentioned. Author (ESA)

N83-33618# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
GLOBAL EXTRAPOLATION OF A FIRST ORDER SPLITTING METHOD
J. G. Verwer and H. B. deVries Mar. 1983 16 p refs Submitted for publication
(MC-NW-150/83) Avail: NTIS HC A02/MF A01

The numerical solution of multispace dimensional parabolic partial differential equations is discussed. Classic global Richardson extrapolation for splitting methods are advocated especially the first order locally one dimensional splitting method. This robust, low order splitting method rapidly damps high frequency components, and it possesses excellent stability properties for nonlinear problems. Global extrapolation to higher order leaves these properties invariant, and easy to implement. The method is compared with a local extrapolation procedure proposed by Lawson and Morris. Author (ESA)

N83-33619# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
LINEAR MULTISTEP METHODS FOR VOLTERRA INTEGRAL AND INTEGRO-DIFFERENTIAL EQUATIONS
P. J. vanderHouwen and H. J. J. teRiele Apr. 1983 45 p refs Submitted for publication
(MC-NW-151/83) Avail: NTIS HC A03/MF A01

A general class of linear multistep methods is presented for numerically solving first and second kind Volterra integral equations, and Volterra integro-differential equations. These so-called VLM methods, which include direct quadrature methods, allow for a unified treatment of the problems of consistency and convergence, and have a pendant in linear multistep methods for ordinary differential equations. General consistency and convergence results are presented together with results of numerical experiments which support the theory. Author (ESA)

N83-33620# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Applied Mathematics.
HOPF BIFURCATION FOR VOLTERRA CONVOLUTION EQUATIONS
O. Diekmann and S. A. vanGils Sep. 1982 9 p refs Presented at Equadiff 82, Wuerzburg, West Germany, 1982 Submitted for publication
(MC-TW-226/82) Avail: NTIS HC A02/MF A01

A standard dynamical description of the Hopf bifurcation for nonlinear Volterra integral equations of convolution type is given, starting from a semigroup construction. The choice of a space of forcing functions as the state space avoids technical difficulties; a variation-of-constants formula allows the construction of a center manifold, on which the flow is governed by an ordinary differential equation. There is an intimate relation between the direction of bifurcation and stability, whence a formula for the direction interims of computable quantities. Author (ESA)

N83-33621# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Applied Mathematics.
SPECTRUM AND EIGENFUNCTIONS OF A DIFFERENTIAL OPERATOR ARISING BY LINEARIZATION OF THE FISHER AND RELATED EQUATIONS
E. J. M. Veling (National Inst. for Water Supply) Dec. 1982 27 p refs Submitted for publication
(MC-TW-232/82) Avail: NTIS HC A02/MF A01

The linearized differential equation for a class of semilinear diffusion problems from population genetics is studied in order to estimate the rate of exponential convergence to a stable stationary solution. Monotonicity properties of the lowest eigenvalue with respect to the parameters of the problem are given. Two types of lower bounds for this eigenvalue are constructed and compared. For Fisher nonlinearity the eingenvalue problem can be solved by an explicit representation of the eigenfunction as a hypergeometric polynomial. For cubic nonlinearity the eigenfunction can be represented by a Heun function. Author (ESA)

N83-33622# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Applied Mathematics.
VIRTUAL PERIODS AND GLOBAL CONTINUATION OF PERIODIC ORBITS
S.-N. Chow (Michigan State Univ., East Lansing) Feb. 1983 11 p refs Submitted for publication
(Grant NSF MCS-82-01768)
(MC-TW-234/83) Avail: NTIS HC A02/MF A01

An earlier result about global bifurcation of periodic orbits under the restriction that the phase space is three or four dimensional is improved. Author (ESA)

N83-33623# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Applied Mathematics.
COMPUTATIONAL ASPECTS OF TWO COMPONENT CHROMATOGRAPHY
J. V. Lankelma Mar. 1983 26 p refs Submitted for publication
(MC-TW-236/83) Avail: NTIS HC A03/MF A01

The theory of multicomponent chromatography is introduced. Explicit formulas are presented for two-component systems. The adsorption isotherm is shown to be critical. The Langmuir form, where the K-values have to be estimated from numerical data is recommended. It is expected that for classes of related compounds, reliable estimates of K-values can be obtained, with component interaction taken into account. Using these empirical values in the Langmuir form, the theory then yields information regarding the separation process. Author (ESA)

N83-33624# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Pure Mathematics.
THE GENERALIZED ABEL TRANSFORM FOR SL (2, C)
R. Brummelhuis (Amsterdam Univ.) and T. H. Koornwinder Oct. 1982 42 p refs Presented at Intensive Sem. on Topics in Mod. Harmonic Anal., Italy Submitted for publication
(MC-ZW-179/82) Avail: NTIS HC A03/MF A01

The generalized Abel transform for SL(2,C) in the case of equal left and right, fixed K-type is rewritten as an integral transform of classical type. It then involves a double integration with kernel expressed in terms of a Chebyshev polynomial of the second kind. The inversion formula is obtained in a similar form and the image in the C infinity case is characterized. The subquotient theorem for SL(2,C) is proved by a global approach. Author (ESA)

N83-33625# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Pure Mathematics.
MATRIX ELEMENTS OF IRREDUCIBLE REPRESENTATIONS OF SU(2) X SU(2) AND VECTOR-VALUED ORTHOGONAL POLYNOMIALS
T. H. Koornwinder Dec. 1982 21 p refs Submitted for publication
(MC-ZW-180/82) Avail: NTIS HC A02/MF A01

The matrix elements of irreducible representations of SU(2) x SU(2) in a diag(SU(2)xSU(2))-basis are expressed in terms of vector-valued orthogonal polynomials, which generalize the Jacobi polynomials. These polynomials are obtained together with an integral representation and a power series expansion. A method to deform the integral of an analytic function over SU(2) into the complexification SL(2,C) by multiplication on the right of the integration variable with a particular element of SL(2,C), and an unexpected symmetry for the vector-valued polynomials are presented. Author (ESA)

N83-33626# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Pure Mathematics.
A CHARACTERIZATION OF SOME GEOMETRIES OF EXCEPTIONAL LIE TYPE
Arjeh M. Cohen and Bruce N. Cooperstein Dec. 1982 41 p refs Submitted for publication

(MC-ZW-181/82) Avail: NTIS HC A03/MF A01

For geometries associated with permutation representations of the groups of Lie type E sub 6, E sub 7, E sub 8, on certain maximal parabolic subgroups, axiom systems are given that characterize them in terms of points and lines. Author (ESA)

N83-33627# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Pure Mathematics.
LOG-CONVEX TRAPEZOIDAL APPROXIMATION OF AN ELEMENTARY INTEGRAL
J. vandeLune and N. M. Temme Dec. 1982 15 p refs
(MC-ZW-183/82) Avail: NTIS HC A02/MF A01

The definite integral over the unit interval of X to the power S, S>0 is approximated by the canonical trapezoidal rule T sub n which is a function of an integer n. When this integer ranges over all the positive integers, a sequence, whose log-convexity is studied, results. The method used is an integral representation of T sub n. The sequence T sub n, n variable, is proved to be log-convex in n if the parameter S belongs to the open interval defined either by the pair of integers 1,3 or by the pair 5,7. Author (ESA)

N83-33628# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Pure Mathematics.
INTEGRATION OF THE LINEAR FILTERING PROBLEM BY MEANS OF CANONICAL TRANSFORMATIONS
Henryk Gzyl Mar. 1983 11 p refs Submitted for publication
(MC-ZW-184/83) Avail: NTIS HC A02/MF A01

The formal analogy of quantum mechanics and filtering theory is discussed. The DMZ-equation is integrated by transforming it into a Schroedinger equation that can be integrated in the standard way. Author (ESA)

N83-33629# National Oceanic and Atmospheric Administration, Seattle, Wash. Pacific Marine Environmental Lab.
DATA INTERCOMPARISON THEORY. 2: TRINITY STATISTICS FOR LOCATION, SPREAD AND PATTERN DIFFERENCES
Rudolph W. Freisendorfer and Curtis D. Mobley Dec. 1982 101 p refs
(PB83-184101; NOAA-TM-34L-PMEL-39; CONTRIB-601) Avail: NTIS HC A06/MF A01 CSCL 12A

The authors examine three basic measures of data-set separation and procedures by which these measures can be assigned statistical significance. The three measures are for the distances between means (SITES), variances (SPRED), and patterns (SHAPE) of space-time geophysical multivariate data sets. The patterns, in turn, are resolved into spatial and temporal patterns. The problem of determining procedures to generate reference distributions, by which statistical significance is decided, is resolved into five parts, depending on the amount of data available for use. The authors classify availability of data into five categories: adequate, semi-adequate, borderline, semi-inadequate, and inadequate. For each of these settings the authors develop procedures to generate reference distributions for SITES and SPRED, and determine the power curves for these two statistics under selected proccedures. These power curves are compared with those generated by some classical tests for the relative location and spread of multivariate data sets. The proposed statistics SITES and SPRED and some of their distribution-producing procedures appear to be relatively powerful and robust. GRA

N83-33630# National Oceanic and Atmospheric Administration, Miami, Fla. Research Facilities Center.
FIRST ORDER AUTOREGRESSIVE LOW-PASS FILTERS: A USER'S QUICK REFERENCE HANDBOOK
Francis J. Merceret Feb. 1983 30 p refs
(PB83-189456; NOAA-TM-ERL-RFC-9; NOAA-83032402) Avail: NTIS HC A03/MF A01 CSCL 12A

A collection of formulas, charts and tables describing the properties of first order autoregressive low-pass filters is presented. The collection is structured for utility rather than mathematical sophistication. It provides a quick reference for those using these simple digital low-pass filters. The response characteristics are presented in both the time and frequency domains, and problems associated with record length and initialization are discussed. Author (GRA)

N83-32726# Air Force Systems Command, Wright-Patterson AFB, Ohio.
BEZIER PLOTTING THEOREM AND GEOMETRIC CHARACTERISTICS OF CUBIC BEZIER CURVES
Shi Fazhong and Wu Junheng *In its* Acta Aeron. et Astronautica Sinica (FTD-ID(RS)T-1605-82) 4 Mar. 1983 p 151-161 refs Transl. into ENGLISH from Hang Kong Xuebao (China), v. 3, no. 3, Sep. 1982 p 97-104 (For primary document see N83-32717 21-01)
Avail: NTIS HC A08/MF A01 CSCL 12/1

N83-33291# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
MATHEMATICAL MODEL FOR THE EVALUATION OF DOPPLER MEASUREMENTS [MATHEMATISCHES MODELL ZUR AUSWERTUNG VON DOPPLERMESSUNGEN]
Wolfgang Schlueter and Peter Pesec *In its* The German-Austrian Doppler Campaign 1982 p 37-54 refs In GERMAN (For primary document see N83-33288 21-43)
Avail: NTIS HC A07/MF A01

N83-33644# Kyoto Univ. (Japan). Dept. of Physics.
PROPERTIES OF DOUBLE GEL'FAND POLYNOMIALS AND THEIR APPLICATIONS TO MULTIPLICITY-FREE PROBLEMS
Yoshikazu Fujiwara and Hisashi Horiuchi *In* Kyoto Univ. Mem. of the Fac. of Sci., Kyoto Univ., Ser. of Phys., Astrophys., Geophys. and Chem., Vol. 36, No. 2 Mar. 1983 p 1-280 refs (For primary document see N83-33643 21-70)
Avail: NTIS HC A09/MF A01

N83-33655# Nagoya Univ. (Japan). Dept. of Information Science.
TREE LANGUAGE ACCEPTED BY PROBABILISTIC TREE AUTOMATON WITH ISOLATED CUT-POINT
Kazue Sugino, Yasuyoshi Inagaki, and Teruo FukumurA *In* Nagoya Univ. Mem. of the Fac. of Eng., Nagoya Univ., Vol. 34, No. 1 May 1982 p 139-148 refs (For primary document see N83-33650 21-70)
Avail: NTIS HC A07/MF A01

N83-33658# Tokyo Denki Univ. (Japan). Dept. of Electronic Engineering.
AN APPROACH OF REALIZING A DIGITAL FIR FILTERS USING SUBFILTERS
S. Nakamura and S. K. Mitra (California Univ., Santa Barbara) *In its* Res. Repts. of the Fac. of Eng., Tokyo Denki Univ., No. 30 Dec. 1982 p 11-22 refs (For primary document see N83-33656 21-70)
Avail: NTIS HC A08/MF A01

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N83-33631*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
ANALYSIS OF RANDOM SIGNAL COMBINATIONS FOR SPACECRAFT POINTING STABILITY
Leonard Howell Aug. 1983 18 p refs
(NASA-TP-2216; NAS 1.60:2216) Avail: NTIS HC A02/MF A01 CSCL 12A

Methods for obtaining the probability density function of random signal combustions are discussed. These methods provide a realistic criteria for the design of control systems subjected to external noise with several important applications for aerospace problems. Author

N83-33632# Florida State Univ., Tallahassee. Dept. of Statistics.
DISPERSIVE ORDERING RESULTS
James Lynch (Pennsylvania State Univ.) and Frank Proschan Feb. 1983 8 p refs
(Contract F49620-82-K-0007; AF Proj. 2304)
(AD-A127587; AFOSR-83-0303TR; FSU-STATISTICS-M651; TR-83-155) Avail: NTIS HC A02/MF A01 CSCL 12/1

A distribution F is less dispersed than a distribution G if $1/F(B)-1/F(A) < \text{or} = 1/G(A)$ for all $0 < A < B < 1$ ($F <$ or $=$ G). We generalize a characterization of dispersive ordering of Shaked (1982) J. Appl. Prob. concerning sign changes of F sub c - G, where F sub c is a translate of F. We then use this generalization plus total positivity to develop a simple proof of a characterization of dispersive distributions due to Lewis and Thompson (1981) J. Appl. Prob.; a distribution H is dispersive if F < or = G approaches H F < or = H G. GRA

N83-33633# Army Engineer Topographic Labs., Fort Belvoir, Va.
AN EXTENSION OF KENDALL'S CONCORDANCE TEST WHERE TIES ARE ALLOWED
Michael A. Crombie and Jean M. Benson Feb. 1983 40 p refs
(DA Proj. 4A7-62707-A-855)
(AD-A128401; ETL-0316) Avail: NTIS HC A03/MF A01 CSCL 12/1

Kendall's measure of concordance and associated probability tables establishes critical regions for testing the null hypothesis of random rankings of M items by N judges. The M items are ranked according to an agreed upon criterion, such as beauty and cost effectiveness, or to the efficacy of a compression scheme, which was the basis for this Research Note. The concordance probability values are approximated by the F-distribution and the tests require that each judge produce a valid ranking of the M item, i.e., ties among the items are not allowed. The purpose of this work was to develop exact probability tables for a limited number of values of the parameters N and M where, in fact, ties were allowed. Author (GRA)

N83-33634# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Applied Mathematics.
THE MATHEMATICAL MODELING OF ENTRAINED BIOLOGICAL OSCILLATIONS
J. Grasman Dec. 1982 20 p refs Submitted for publication
(MC-TW-230/82) Avail: NTIS HC A02/MF A01

Perturbation methods are used for the mathematical analysis of coupled relaxation oscillators. Entrainment by an external periodic stimulus, and mutual entrainment of coupled oscillators with different limit cycles are treated. The oscillators are of a type used in the modelling of biological oscillators by chemical reactions and electronic circuits. Entrainment different from 1:1 is stressed. The results relate to phenomena occurring in physiological experiments, such as the periodic stimulation of neural and cardiac cells, and in the nonregular functioning of organs and organisms, such as the AV-block in the heart and certain deviations from the regular circadian rhythm. Author (ESA)

N83-33635# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Applied Mathematics.
THE STABLE SIZE DISTRIBUTION: AN EXAMPLE IN STRUCTURED POPULATION DYNAMICS
O. Diekmann Dec. 1982 10 p refs Presented at Intern. Symp. on Math. Ecol., Trieste, Italy, 1982 Submitted for publication
(MC-TW-231/82) Avail: NTIS HC A02/MF A01

Models for the growth of populations which reproduce by fission are discussed. Convergence towards a stable distribution, using linear equations, and interaction via the growth function (a feedback mechanism which admits a clear biological interpretation), using nonlinear equations, are treated. It is shown that the models can yield systems of ordinary differential equations. Author (ESA)

N83-33636# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Applied Mathematics.
HOLLING'S HUNGRY MANTID MODEL FOR THE INVERTEBRATE FUNCTIONAL RESPONSE CONSIDERED AS A MARKOV PROCESS. PART O: A SURVEY OF THE MAIN IDEAS AND RESULTS
J. A. J. Metz and F. H. D. vanBatenburg (Leiden Univ.) Jan. 1983 14 p refs Presented at Intern. Symp. on Math. Ecol., Trieste, Italy, 1982 Submitted for publication
(MC-TW-233/83-Pt-O) Avail: NTIS HC A02/MF A01

An analytical approach to Holling's simulation model for mantid predatory behavior is proposed. Starting from a general representation as a Markov process, with a complicated state space, a series of approximations, suggested by the relative values of the various parameters are introduced. A set of coupled partial integro-differential equations from which the functional response and the variance of the total catch can be calculated are introduced. Simple explicit expressions for these quantities are given. Author (ESA)

N83-33637# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Applied Mathematics.
GROWTH, FISSION AND THE STABLE SIZE DISTRIBUTION
O. Diekmann, H. A. Lauwerier (National Inst. for Water Supply, Leidenschendam, Netherlands), T. Aldenberg (Leiden Univ., Netherlands), and J. A. J. Metz Feb. 1983 23 p refs Submitted for publication
(MC-TW-235/83) Avail: NTIS HC A02/MF A01

A model for the growth of a size-structured population reproducing by fission and living under changing nutrient conditions is formulated and analyzed. It is shown that the dynamics are asymptotically described by an ordinary differential equation total population model, while the size distribution becomes stationary. Author (ESA)

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N83-33638# Yale Univ., New Haven, Conn. Center for Systems Science.
A N-PLAYER SEQUENTIAL STOCHASTIC GAME WITH IDENTICAL PAYOFFS
Kumpati S. Narendra and Richard M. Wheeler, Jr. Aug. 1982 19 p refs Sponsored by NSF
(Rept-8209) Avail: NTIS HC A02/MF A01

A sequential stochastic game among an arbitrary number of players in which all players' payoffs are identical is analyzed. The players are unaware that they are in a game and hence they have no knowledge of other players' strategies or the payoff structure. At each instant the players use a simple learning algorithm to update their mixed strategy choices based entirely on the response of the environment. It is shown that the expected change in each player's payoff is non-negative at every instant so that the group improves its performance monotonically. This result appears to have important implications in decentralized decision making in large complex systems. M.G.

N83-33639# California Univ., Livermore. Lawrence Livermore Lab.
EXPERIMENTAL DESIGN AND DATA ANALYSIS
Stanley L. Grotch 7 Dec. 1982 36 p refs Presented at the 10th Ann. Compatibility Conf., Albuquerque, N. Mex., 26 Oct. 1982
(Contract W-7405-eng-48)
(DE83-004143; UCRL-88465; CONF-821038-7) Avail: NTIS HC A03/MF A01

This paper focuses on a number of the considerations found to be of practical importance in the areas of experimental design and data analysis. These are discussed using a format in which these issues are first raised in terms of questions and then explored in general terms. A real practical example of model building, using actual cushion data, is given. This discussion shows some of the

pitfalls which can be encountered when using empirical models. The use of confidence limits in assessing the predictive ability of models is also explored. Finally, some suggestions are given to aid the novice in experimental design. DOE

N83-33640# Saab-Scania, Linkoping (Sweden).
AN OPTIMAL MISSILE DUEL ON NONSHORT RANGE
Bernt Jaermark 1983 60 p refs
(SAAB-TN-Ae-74; ISSN-0080-5149) Avail: NTIS HC A04/MF A01

A differential game is formed by two aircraft performing a long range missile duel. The duel starts for each aircraft with an aggressive phase until missile launch then evasion commences. In solving the differential game problem an optimization algorithm consisting of a first order differential dynamic programming method combined with an effective convergence control technique is used. A transversality condition is derived. Three dimensional spatial motion of point masses vehicles are used. The models for aircraft and missiles are fully realistic with speed and altitude dependent performance and associated constraints. The results from optimizing the problem point out potential tactics. The desirability of entering the game with a higher altitude/velocity condition than the opponent is stressed. Author (ESA)

N83-33641# Saab-Scania, Linkoping (Sweden).
ON PURSUIT-EVASION BETWEEN TWO REALISTIC AIRCRAFT
C. Hillberg and B. Jaermark 1983 41 p refs
(SAAB-TN-Ae-75; ISSN-0080-5149) Avail: NTIS HC A03/MF A01

Differential game problems consisting of two aircraft with variable speed in coplanar motions are analyzed by the differential dynamic programming method. The formulation is made as a pursuit-evasion problem, with the final range, at the specified final time, as the measure of the game. Turning rate is constrained to structural as well as stall limits by a steep penalty method. Results show the importance of the ability to optimize a nonlinear problem. For example, a throttle off for a few seconds can have a considerable influence on the optimal cost value. For high performance aircraft, good acceleration performance should be combined with adequate deceleration means. Author (ESA)

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N83-33642# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Pure Mathematics.
WEAK DISJOINTNESS AND THE EQUICONTINUOUS STRUCTURE RELATION
Joe Auslander, Doug McMahon, Jaap vanderWoude, and Ta Sun Wu Feb. 1983 33 p refs Submitted for publication
(MC-ZW-182/83) Avail: NTIS HC A03/MF A01

Weak disjointness of homomorphisms of minimal transformation groups are discussed. The techniques involved are used to study the equicontinuous structure relation. Author (ESA)

N83-32976 Polish Academy of Sciences, Warsaw.
SECTION OF CONTINUUM ELECTRODYNAMICS
In its Sci. Activities of the Polish Acad. of Sci. 1983 p 66-68 (For primary document see N83-32969 21-31)
Avail: Issuing Activity

N83-33664# Tokyo Denki Univ. (Japan).
ON POINTWISE COMPACTNESS IN THE SPACE OF BAIRE FUNCTIONS OF CLASS 1
Kazuyuki Tsurumi *In its* Res. Repts. of the Fac. of Eng., Tokyo Denki Univ., No. 30 Dec. 1982 p 95-102 refs In JAPANESE; ENGLISH summary (For primary document see N83-33656 21-70)
Avail: NTIS HC A08/MF A01

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N83-33643# Kyoto Univ. (Japan).
MEMOIRS OF THE FACULTY OF SCIENCE, KYOTO UNIVERSITY. SERIES OF PHYSICS, ASTROPHYSICS, GEOPHYSICS AND CHEMISTRY, VOLUME 36, NO. 2
Nissha Printing Co. Ltd. Mar. 1983 181 p refs
Avail: NTIS HC A09/MF A01

Topics in physics, astrophysics, mathematics, and astronomy are discussed. Properties of double Gel'fand polynomials and their applications to multiplicity-free problems, a telescope azimuth stabilization system, the elastic scattering of polarized protons, hypersensitization of photographic plates, and near-infrared source counts on the galactic plane are among the topics discussed. For individual titles, see N83-33644 through N83-33649.

N83-33644# Kyoto Univ. (Japan). Dept. of Physics.
PROPERTIES OF DOUBLE GEL'FAND POLYNOMIALS AND THEIR APPLICATIONS TO MULTIPLICITY-FREE PROBLEMS **c64**
Yoshikazu Fujiwara and Hisashi Horiuchi *In* Kyoto Univ. Mem. of the Fac. of Sci., Kyoto Univ., Ser. of Phys., Astrophys., Geophys. and Chem., Vol. 36, No. 2 Mar. 1983 p 1-280 refs (For primary document see N83-33643 21-70)
Avail: NTIS HC A09/MF A01

Properties of double Gel'fand polynomials are reviewed with some new derivation processes, by making the most of the integration method in the Bargmann space. The vector-coupling expressions of double Gel'fand polynomials in two-fold ways are shown not only to be of basic importance for the application to nuclear many-body problems, but also to have many fruitful contents when they are used in combination with other properties. Applications are discussed with respect to the multiplicity-free problems of the SU2 and SU3 algebras, coherent states and Talmi-Moshinsky-Smirnov coefficients. Author

N83-33645# Kyoto Univ. (Japan). Dept. of Physics.
A BALLOON-BORNE FAR-INFRARED TELESCOPE WITH A NEW AZIMUTH STABILIZATION SYSTEM **c88**
Norihisa Hiromoto, Toshinori Maihara, Naoki Oda, Haruyuki Okuda, and Hiroshi Shibai *In* Kyoto Univ. Mem. of the Fac. of Sci., Kyoto Univ., Ser. of Phys., Astrophys., Geophys. and Chem., Vol. 36, No. 2 Mar. 1983 p 281-289 refs (For primary document see N83-33643 21-70)
Avail: NTIS HC A09/MF A01

A small telescope control system was developed for balloon-borne far-infrared scanning observations with medium angular resolution. The stabilization of a balloon gondola was performed by a reaction wheel-based servo-mechanical system driven by a torque motor, realizing pointing accuracy better than 0.1. The method employed in this system is unique in that only the internal frame which the telescope is attached to is stabilized around a vertical axis of the gondola, while the outer gondola is being oriented separately by the so-called twist-rewinding servosystem. The performance of the whole system is presented including the three-color far-infrared photometer actually used in the last observation. Author

N83-33646# Kyoto Univ. (Japan). Dept. of Astromony.
AN AUTOGUIDER SYSTEM FOR THE 40 CM SCHMIDT TELESCOPE **c89**
Hiroshi Ohtani, Takashi Ichikawa, Toshiyuki Sasaki, Kyoji Saito, and Tamiyuki Tsujimura *In* Kyoto Univ. Mem. of the Fac. of Sci., Kyoto Univ., Ser. of Phys., Astrophys., Geophys. and Chem., Vol. 36, No. 2 Mar. 1983 p 291-303 refs (For primary document see N83-33643 21-70)
Avail: NTIS HC A09/MF A01

An autoguider system was constructed for the 40 cm Schmidt telescope at the Ouda Station. The sensor of the guider, a type ITT FW 130 image dissector, is attached to the guiding telescope.

A microprocessor is introduced for processing the sensor output and for correcting the guiding error of the telescope. This enables the broadening of the objective prism spectra by a simple software. The microprocessor is used also for other auxiliary functions for the telescope control. Author

N83-33647# Kyoto Univ. (Japan). Dept. of Physics.
SYSTEMATIC STUDY ON THE ELASTIC SCATTERING OF 65 MeV POLARIZED PROTONS c72
Harutaka Sakaguchi *In* Kyoto Univ. Mem. of the Fac. of Sci., Kyoto Univ., Ser. of Phys., Astrophys., Geophys. and Chem., Vol. 36, No. 2 Mar. 1983 p 305-341 refs (For primary document see N83-33643 21-70)
Avail: NTIS HC A09/MF A01

Elastic scattering of 65 MeV polarized protons from 25 nuclei (16O-209Bi) was measured. Systematics of the optical potential, which reproduces both the analyzing power and the differential cross section data remarkably, was persued. The volume integral of the real central part of the optical potential (Jr) shows a behavior similar to the binding energy curve for the target mass number. The mean square radius of the real central part of the optical potential is found to obey the relation < square radius > pot = 0.937 plus or minus 0.012) A(2/3)+ (6.42 plus or minus 0.21)fm2. By comparing with the systematics of the charge distributions obtained from electron scattering data, it is found that the effective two-body interaction range between an incident proton and a nucleon in the target has a target mass number dependence given by < square radius > int = (0.132 plus or minust 0.013) A(2/3)+ (4.24 plus or minus 0.24 fm2. Assuming this relation, root mean square radii of the point nucleon distributions are obtained. The dependences of the Jr-value and the < square radius > pot value on the mass number and energy obtained here are compared critically with recent microscopic optical potential calculations. R.J.F.

N83-33648# Kyoto Univ. (Japan). Dept. of Astronomy.
HYPERSENSITIZATION ON KODAK IIIa-J PLATES BY BAKING IN FORMING GAS c35
Toshiyuki Sasaki *In* Kyoto Univ. Mem. of the Fac. of Sci., Kyoto Univ., Ser. of Phys., Astrophys., Geophys. and Chem., Vol. 36, No. 2 Mar. 1983 p 343-351 refs (For primary document see N83-33643 21-70)
Avail: NTIS HC A09/MF A01

Experiments of hypersensitization of Kodak IIIa-J plates (batch 2K7) by baking in forming gas with a sealed baking tube was conducted. Baking conditions about temperature and time were tested to find the optimum baking condition by means of relative detective quantum efficiency. A number of plates baked simultaneously in the sealed tube linearly decreases the speed gain and increases the fog. Effects of time spent until exposure after baking and of processing in different developers are examined. R.J.F.

N83-33649# Kyoto Univ. (Japan). Dept. of Physics.
NEAR-INFRARED SOURCE COUNTS IN THE GALACTIC PLANE. PART 2: A LIST OF NEAR-INFRARED SOURCES c89
Kimiaki Kawara, Takashi Kozasa, Shuji Sato, Haruyuki Okuda, Yukiyasu Kobayashi, and Jun Jugaku *In* Kyoto Univ. Mem. of the Fac. of Sci., Kyoto Univ., Ser. of Phys., Astrophys., Geophys. and Chem., Vol. 36, No. 2 Mar. 1983 p 353-392 refs Prepared in cooperation with the Inst. of Space and Astronautical Science, Tokyo and Tokyo Univ. Sponsored in part by the Asahi Press Science Foundation (For primary document see N83-33643 21-70)
Avail: NTIS HC A09/MF A01

Results of near infrared source counts are presented as a list of positions and magnitudes of sources observed in 17 selected areas sampled along the galactic plane between l=349 deg and l=45 deg. The total scanned area was 12 square degrees, and 1,989 sources brighter than 6.5 mag in the K-band are listed. They are also graphically presented in (alpha,delta)-(l,b) maps classifying the magnitudes and the colors of the sources. Author

N83-33650# Nagoya Univ. (Japan). Dept. of Engineering.
MEMOIRS OF THE FACULTY OF ENGINEERING, NAGOYA UNIVERSITY, VOLUME 34, NO. 1
Yasuhisa Yozawa, ed., Takashige Tsukishima, ed., Tadashi Sasaki, ed., Masayuki Suzuki, ed., and Keiji Naito, ed. May 1982 149 p refs
(ISSN-0027-7657) Avail: NTIS HC A07/MF A01

Articles addressing various unrelated topics are compiled. The subjects include inelastic deformation in metals, lightning simulation, turbulent diffusion, nuclear reactor physics, and automata theory. For individual titles, see N83-33651 through N83-33655.

N83-33651# Nagoya Univ. (Japan). Dept. of Mechanical Engineering.
EFFECTS OF COMPLICATED DEFORMATION HISTORY ON INELASTIC DEFORMATION BEHAVIOUR OF METALS c26
Yoshio Ohashi *In* Nagoya Univ. Mem. of the Fac. of Eng., Nagoya Univ., Vol. 34, No. 1 May 1982 p 1-76 refs (For primary document see N83-33650 21-70)
Avail: NTIS HC A07/MF A01

Efforts to establish a precise constitutive equation for inelastic deformation which incorporates history effects are discussed. Results of experimental investigations concerning the inelastic deformation behavior of metals under complication loadings are reviewed. A stress-strain relation is formulated in the form of a tensorial equation which has a generality for a fixed sequence in deformation history. Also, a method is proposed in which the history effect is analyzed as evolutions in the internal state variables, which are parameters globally representing the material behavior due to microstructure. M.G.

N83-33652# Nagoya Univ. (Japan). Dept. of Electrical Engineering.
EXPERIMENT OF ARTIFICIAL LIGHTNING TRIGGERED WITH ROCKET c47
Kenji Horii *In* Nagoya Univ. Mem. of the Fac. of Eng., Nagoya Univ., Vol. 34, No. 1 May 1982 p 77-112 refs Sponsored in part by the Japanese Ministry of Education (For primary document see N83-33650 21-70)
Avail: NTIS HC A07/MF A01

Experiments to investigate the mechanism of lightning discharge including predischarge phenomena, and to develop lightning protection techniques are discussed. The peak value and the duration of the discharge current, the electric field intensity at ground, the altitude of rocket, and other parameters were measured, and the relations among them are discussed. The mechanism of lightning discharge was made clear from optical observation and the measurement of current. The long gap discharges between the bobbin hanging in air and the ground were successfully performed three times. The hairpin effect in a mannequin and the safety of a motorcar for the lightning discharge were confirmed. The surge voltages induced on power distribution lines were measured and the shielding effect of the overhead grounded wire to the test line was confirmed. M.G.

N83-33653# Nagoya Univ. (Japan). Dept. of Mechanical Engineering.
A STUDY ON THE FLUCTUATION CONCENTRATION FIELD IN A TURBULENT JET: ON THE MEASUREMENT OF THE CONCENTRATION FLUCTUATION INTENSITY AND THE SELF-PRESERVATION c34
Ikuo Nakamura, Yasuhiko Sakai, and Masafumi Miyata (Yamanasi Univ.) *In* Nagoya Univ. Mem. of the Fac. of Eng., Nagoya Univ., Vol. 34, No. 1 May 1982 p 113-124 refs (For primary document see N83-33650 21-70)
Avail: NTIS HC A07/MF A01

The diffusion process in a circular jet of a dye solution issuing into a quiescent water was investigated experimentally. Also a semi-empirical theory for the radial profile of the concentration fluctuation intensity is presented. Measurements of the concentration field for a dye solution were performed by a light absorption method because of the simplicity of its measuring principle and movability of the probe. Experimental results showed that the radial profiles of the mean axial velocity and mean concentration had well-known Gaussian distributions. A self-preserving form for the

profiles of the concentration fluctuation intensity was observed in the downstream region x/d sub N > or = 100. Using these results and assumptions of the gradient type diffusion process, an analysis and calculations are presented on the self-preserving profile of the concentration fluctuation intensity. M.G.

N83-33654# Nagoya Univ. (Japan). Dept. of Nuclear Engineering.
REACTOR PHYSICS CONSTANTS FOR THE MEDIUM ENRICHED-URANIUM CORE OF KYOTO UNIVERSITY CRITICAL ASSEMBLY **c73**
Susumu Wakamatsu and Kojiro Nishina *In* Nagoya Univ. Mem. of the Fac. of Eng., Nagoya Univ., Vol. 34, No. 1 May 1982 p 125-138 refs (For primary document see N83-33650 21-70)
Avail: NTIS HC A07/MF A01

Two energy-group eleven-region constants were prepared for the single cylindrical core of the Kyoto University Critical Assembly (KUCA) loaded with uranium fuel of fourty-five per cent enrichment. The procedure is based on the twenty-six-group microscopic cross section libraries MGCL26GR and SMF26GR as its starting point, and on the flux calculations by one-dimensional transport theory code ANISN-JR. Cross sections are averaged with these fluxes as weighting functions. M.G.

N83-33655# Nagoya Univ. (Japan). Dept. of Information Science.
TREE LANGUAGE ACCEPTED BY PROBABILISTIC TREE AUTOMATON WITH ISOLATED CUT-POINT **c64**
Kazue Sugino, Yasuyoshi Inagaki, and Teruo FukumurA *In* Nagoya Univ. Mem. of the Fac. of Eng., Nagoya Univ., Vol. 34, No. 1 May 1982 p 139-148 refs (For primary document see N83-33650 21-70)
Avail: NTIS HC A07/MF A01

A probabilistic tree automaton is introduced by extending the notion of a tree automation. Let A be a probabilistic tree automaton and R sub L (A;lambda) be a congruence relation defined by a tree language L(A;lambda) which a probabilistic tree automaton A accepts with a cut-point lambda, 0 < or = lambda < 1. It is proved that if lambda is an isolated cut-point then the number of equivalence classes of R sub L(A;lambda) is finite, that is, L(A;lambda) is regular. M.G.

N83-33656# Tokyo Denki Univ. (Japan).
RESEARCH REPORTS OF THE FACULTY OF ENGINEERING, TOKYO DENKI UNIVERSITY, NO. 30
Dec. 1982 175 p refs In JAPANESE; ENGLISH summaries
Avail: NTIS HC A08/MF A01

Research studies were conducted in many related areas. Electrons and electric field studies were conducted. Specifically, research was done in such areas as silicon solar cells, silicon films deposition characteristics, signal processing and the utility of digital filtering. For individual titles, see N83-33657 through N83-33667.

N83-33657# Tokyo Denki Univ. (Japan).
BACK-SCATTERING OF ELECTRONS IN A NON-EQUILIBRIUM HIGH ELECTRIC FIELD **c72**
Mikio Ohuchi and Tadahiro Kubota *In its* Res. Repts. of the Fac. of Eng., Tokyo Denki Univ., No. 30 Dec. 1982 p 1-10 refs In JAPANESE; ENGLISH summary (For primary document see N83-33656 21-70)
Avail: NTIS HC A08/MF A01

Some electrons emitted from a cathode return to the cathode after a few times of collision with gas atoms or molecules (Back-scattering or Back-diffusion). In a case of secondary electron emission from the cathode due to ionic impact, this backscattering effect appears even in a relatively high electric field and inelastic collisions cannot be neglected. So far, the theoretical analysis of non-equilibrium state with high electric field was not reported. This effect in the cathode fall region of flow discharges in such state, is treated using the Monte Carlo simulation and the analysis of transport equations. B.W.

N83-33658# Tokyo Denki Univ. (Japan). Dept. of Electronic Engineering.
AN APPROACH OF REALIZING A DIGITAL FIR FILTERS USING SUBFILTERS **c64**
S. Nakamura and S. K. Mitra (California Univ., Santa Barbara) *In its* Res. Repts. of the Fac. of Eng., Tokyo Denki Univ., No. 30 Dec. 1982 p 11-22 refs (For primary document see N83-33656 21-70)
Avail: NTIS HC A08/MF A01

This paper considers the design of an FIR digital by interconnecting a number of identical FIR subfilters with the aid of a few additional adders and multipliers. The overall structure is in the form of a tapped cascaded FIR subfilters. A composite method to determine the tapping coefficients along with the coefficients of the subfilter to approximate overall frequency response characteristics is proposed. Several numerical examples illustrating the proposed method are included. Author

N83-33659# Tokyo Denki Univ. (Japan).
AMORPHOUS SILICON SOLAR CELLS **c44**
K. Ebara, K. Homma, T. Fukami, Y. Kobayashi, Y. Abe, and T. Aono *In its* Res. Repts. of the Fac. of Eng., Tokyo Denki Univ., No. 30 Dec. 1982 p 23-40 refs In JAPANESE; ENGLISH summary (For primary document see N83-33656 21-70)
Avail: NTIS HC A08/MF A01

Theoretical study is made on the effect of localized states and internal field upon the conversion efficiency in graded-bandgap amorphous silicon solar cells. The distribution of localized states in the bandgap is approximated by two expressions, symmetrical and asymmetrical U shape. The internal electric field is assumed to be formed by doping a proper amount of impurity atoms. The space charge and the internal field are calculated by using the Poisson's equations. Collection efficiency of photo-generated carriers and photovoltaic conversion efficiency are obtained by solving a continuity equation. The result of the analysis indicates that the concentration of doping impurity atoms required to produce a high internal field depend strongly on the density of localized states and then distribution. In addition, the collection and the conversion efficiency depend on the distribution of the internal field. In the case of constant distribution of the field, efficient collection of photo-generated carriers is shown. Author

N83-33660# Tokyo Denki Univ. (Japan).
PREPARATION OF AMORPHOUS SILICON FILMS BY GLOW DISCHARGE DEPOSITION METHOD. HIGHLY PHOTOCONDUCTIVE FILM FORMATION UNDER dc ELECTRIC FIELD SUPERIMPOSED ON RF PLASMA **c76**
K. Homma, K. Ebara, T. Fukami, Y. Kobayashi, Y. Abe, and T. Aono *In its* Res. Repts. of the Fac. of Eng., Tokyo Denki Univ., No. 30 Dec. 1982 p 41-64 refs In JAPANESE; ENGLISH summary (For primary document see N83-33656 21-70)
Avail: NTIS HC A08/MF A01

Effect of electric field applied to RF plasma on the deposition process and the electrical and optical properties of a-Si: Hfilms has been studied. Plasma condition is widely controlled by the action of dc voltage applied to a sample holder and a screen electrode. Photoconductivity of deposited films increases considerably with the increase in the voltages of the holder, V sub h and the screen V sub s but it is independent of their polarity. Hydrogen content of the films is controlled in the range of 7 to 40 at. %. The influence of these voltages on deposition rate and optical gap is also examined. Studies of growth morphology indicate that both of these voltages play a significant role in the formation of homogeneous and uniform film. From considerations of the deposition kinetics and the observed results, it is suggested that the photoconductive properties of a-Si: Hare closely related to hydrogen distribution and defects. Author

N83-33661# Tokyo Denki Univ. (Japan).
MOLECULAR ORBITAL CONSIDERATIONS ON HYDROGEN BOND ENERGY AND ELECTRONIC PROPERTIES OF 2-PYRIDONE-2-AMINOPYRIDINE COMPLEX **c72**
Kozo Inuzuka and Akira Fujimoto *In its* Res. Repts. of the Fac.

of Eng., Tokyo Denki Univ., No. 30 Dec. 1982 p 65-76 refs In JAPANESE; ENGLISH summary (For primary document see N83-33656 21-70)
Avail: NTIS HC A08/MF A01

The hydrogen bond energy of the 2-pyridone-2-aminopyridine complex was calculated by the CNDO/2 method and measured by the (1)H-NMR spectroscopic method to compare with the calculated energy. And Also, the transition energies and oscillator strengths of the complex were calculated by the CNDO/C1 method. The calculated results were compared with the UV adsorption spectrum of the 2-pyridone-2-aminopyridine system. The calculated results of the complex are consistent with the experimental results. Author

N83-33662# Tokyo Denki Univ. (Japan).
THE LINEAR PHASE FIR REAL-TIME FILTER FOR BIO SIGNAL PROCESSING IMPLEMENTED WITH 8 BIT MICRO-PROCESSOR c52
Tatsuo Ishihara, Shogo Nakamura, and Makoto Kotani *In its* Res. Repts. of the Fac. of Eng., Tokyo Denki Univ., No. 30 Dec. 1982 p 77-87 refs In JAPANESE; ENGLISH summary (For primary document see N83-33656 21-70)
Avail: NTIS HC A08/MF A01

In this paper, a very simple linear phase FIR filter having a high-pass and notch characteristics is proposed. The principle of such multiple notched filter is that: the output of the multiple band-pass filter which is constructed using the concept of the extended CIC (cascaded integrator-comb) filter is subtracted from the delayed original input signal. The filter has been implemented using a 8-bit conventional micro-processor, and has 3-channels real-time input-outputs. B.W.

N83-33663# Tokyo Denki Univ. (Japan). Dept. of Electronic Engineering.
THE MEASUREMENT OF AMBIPOLAR-DIFFUSION COEFFICIENT OF Ar2+ IN A HIGH TEMPERATURE ARGON PLASMA AFTERGLOW c75
T. Kaneda, R. M. Hobson (York Univ.), and Jen-Shih Chang (McMaster Univ.) *In its* Res. Repts. of the Fac. of Eng., Tokyo Denki Univ., No. 30 Dec. 1982 p 89-94 refs Sponsored in part by the National Science and Engineering Research Council of Canada (For primary document see N83-33656 21-70)
Avail: NTIS HC A08/MF A01

The ambipolar-diffusion coefficient of the argon molecular ion has been measured in shock heated afterglow plasmas over the range of gas temperature from 1300 to 2000 K. The ion temperature dependence of the ambipolar-diffusion coefficient was observed to be large in the present range of experiments. Typical order of argon molecular ion ambipolar diffusion coefficient is 2.2 + or - 0.3 sq m/s at 2000 K. Author

N83-33664# Tokyo Denki Univ. (Japan).
ON POINTWISE COMPACTNESS IN THE SPACE OF BAIRE FUNCTIONS OF CLASS 1 c67
Kazuyuki Tsurumi *In its* Res. Repts. of the Fac. of Eng., Tokyo Denki Univ., No. 30 Dec. 1982 p 95-102 refs In JAPANESE; ENGLISH summary (For primary document see N83-33656 21-70)
Avail: NTIS HC A08/MF A01

The notions of compactness, sequential compactness and conutable compactness play important roles in the functional analysis over the real and complex fields. Relations of these compact conditions with respect to the weak topology in a Banach space have been discussed by W. Eberlein, V. L. Simulian, M. Krein, A. Grothendieck and others. The relations among them in the space of continuous functions are investigated by D. J. Pryce. And H. P. Rosenthal gave that the space b sub 1 (X,R) of first Baire functions over the real field R is angelic, i.e., a space in which the above three compact conditions are equivalent and in which each point of the closure of a relatively compact subset A is a limit point of a sequence in A. The purpose of this note is to extend the Rosenthal's results to the nonarchimedean valued fields or more generally metric spaces. Author

N83-33665# Tokyo Denki Univ. (Japan).
A NUMERICAL PROCEDURE FOR NONLINEAR RESPONSE ANALYSIS OF BUILDING SUBJECTED TO MULTI-INPUT c39
Fukuzo Suto and Shyuichi Asayama *In its* Res. Repts. of the Fac. of Eng., Tokyo Denzi Univ., No. 30 Dec. 1982 p 103-120 refs In JAPANESE; ENGLISH summary (For primary document see N83-33656 21-70)
Avail: NTIS HC A08/MF A01

Generally, when solving problems concerning earthquake response of building extended to plan, it is important to recognize not only flexibility of slab but also spatial variations in ground motion along the base of the structure due to wave propagation or spatial soil condition. Especially as for the input waves, it is necessary to consider the time phase difference which occurs in the velocity and the displacement motions of the waves as in that of acceleration. Therefore this method has been developed based upon full consideration about above theoretical condition. In this paper, the authors described a derivation of the numerical procedure for nonlinear response analysis of above structure and consider the accuracy of the method which is mainly dependent upon relation between time increment for response calculation and natural period of the structure. In conclusion, proper time increment for accurate response calculation is decided from some parametric analytical results and possibility of applying this method to practical design of structure in the near future is also described. Author

N83-33666# Tokyo Denki Univ. (Japan).
CONSIDERATIONS ON DEFORMABLE ABILITY AND ULTIMATE STRENGTH OF ASEISMIC WALLS. PART 1: ABOUT THE COUNTER-MEASURE FOR THE IMPROVEMENT OF WALL-DEFORMABILITY c39
Fukuzo Suto *In its* Res. Repts. of the Fac. of Eng., Tokyo Denki Univ., No. 30 Dec. 1982 p 121-144 refs In JAPANESE; ENGLISH summary (For primary document see N83-33656 21-70)
Avail: NTIS HC A08/MF A01

This paper treats the problem of improving the defective characteristics of brittle collapse inherent in conventional type of seismic walls (e.g., field casted, reinforced concrete wall or steel brace) from the viewpoint of enlarging their ducilities much more inquiring into several representative Japanese literatures and experimental materials related to walls. It is constituted by the following two parts; the part I observes on the general aspect of load deflective angle relation according to wall kinds focusing on the deformable ability of theirs and the synthetical governing law and part II observes on simple general formula established by the author for calculation of final shear resisting powers of walls and comparisons of some experimental results with their calculated values. Author

N83-33667# Tokyo Denki Univ. (Japan).
EFFECT OF DEPOSITION CONDITIONS ABOUT PHOTOCHROMIC PROPERTIES OF AgBr-SnO2 MIXTURE FILMS c25
Yoichi Abe *In its* Res. Repts. of the Fac. of Eng., Tokyo Denki Univ., No. 30 Dec. 1982 p 145-158 refs In JAPANESE; ENGLISH summary (For primary document see N83-33656 21-70)
Avail: NTIS HC A08/MF A01

Photochromic properties of AgBr-SnO2 mixture films are greatly affected by deposition conditions. In case of higher substrate temperature and lower deposition rate, the photo darkening sensitivity of the film by UV irradiation becomes higher. The darkening effect is due to the formation of Ag particles by dissociation of AgBr as well as photographs. Generally, an intensely darkened film is bleached by heating in atmosphere, and a slightly darkened film is more darkened. The critical value of optical density of darkening or bleaching is ranged from 0.35 to 0.55. It seems that the darkening or the bleaching is stabilized by heating process. The detailed description of the changes of the surface morphology and the surface structure of these films are also given by using electron microscopy. Author

N83-33668# Massachusetts Inst. of Tech., Cambridge.
RANDOM FIELD EFFECT IN MAGNETS

R. J. Birgeneau Sep. 1982 9 p refs Presented at 6th Yamada Conf. on Neutron Scattering of Condensed Matter, Tokyo, 1 Sep. 1982
(Contract DE-AC02-76CH-00016)
(DE83-002838; BNL-31998; CONF-820935-7) Avail: NTIS HC A02/MF A01

In order to explore the consequences of random field effects a series of neutron scattering experiments were carried out on three prototypical diluted Ising magnets. The systems studied are Rb2Co7Mg3F4 which is a model two dimensional (2D) Ising antiferromagnet, Co(1-x)Zn(x)F2 which is a model 3D Ising antiferromagnet, and Fe(1-x)Zn(x)F2. FeF2 combines Heisenberg exchange interactions with a large Ising crystal field anisotropy so that it should exhibit 3D Ising critical behavior. Extensive measurements on the bulk properties of the Fe(1-x)Zn(x)F2 samples in an applied magnetic field performed by the Santa Barbara group and tnese provide an invaluable adjunct to neutron scattering measurements. DOE

N83-33669# Brookhaven National Lab., Upton, N. Y. Accelerator Dept.
INTRODUCTION TO THE MAGNET AND VACUUM SYSTEMS OF AN ELECTRON STORAGE RING
W. T. Weng 15 Aug. 1982 47 p refs Presented at the Workshop on Synchrotron Radiation Facility, Taipei, Taiwan, 8-9 Apr. 1982
(Contract DE-AC02-76CH-00016)
(DE83-000204; BNL-31838; CONF-820487-1) Avail: NTIS HC A03/MF A01

An accelerator or storage ring complex is a concerted interplay of various functional systems. For the convenience of discussion it can be divided into the following systems: injector, magnet, RF, vacuum, instrumentation and control. In addition, the conventional construction of the building and radiation safety consideration are also needed and finally the beam lines, detector, data acquisition and analysis set-ups for research programs. A comprehensive review of the whole complex and the operation of such a facility is given. Only the general function of each system and the basic design concepts will be introduced, no detailed engineering practice will be given which will be best done after a machine design is produced. For further understanding and references a table of bibliography is provided at the end of the paper. DOE

N83-33670# Brookhaven National Lab., Upton, N. Y.
LONGITUDINAL INSTABILITIES OF LONG GAUSSIAN BUNCHES
S. Krinsky and J. M. Wang 1983 4 p refs Presented at the Particle Accelerator Conf., Sante Fe, N. Mex., 21-23 Mar. 1983
(Contract DE-AC02-76CH-00016)
(DE83-010158; BNL-32724; CONF-830311-18) Avail: NTIS HC A02/MF A01

An overview of the longitudinal instabilities of Gaussian bunches subject to a harmonic RF potential is presented. Emphasis is on the behavior of long bunches having lengths greater than the wavelength of the perturbing electromagnetic fields. The crossover between the dominance of the synchrotron modes and the coasting-beam-like distortions of the bunch distribution are exhibited. It occurs as the real or imaginary part of the coherent oscillation frequency becomes large compared to the synchrotron oscillation frequency. For a narrow band impedance the growth rate of the coasting-beam-like modes is determined by the average beam current, and for a broad band impedance the growth rate is determined by the peak current. The transition between these two regimes by considering the growth rate as a function of the bandwidth of the impedance is discussed. DOE

N83-33671# Graz Univ. (Austria). Inst. fuer Nachrichtentechnik und Wellenausbreitung.
TIME KEEPING AND METHODS OF TERRESTRIAL TIME COMPARISON, WITH THE EXAMPLE OF THE TIME STATION OF THE LUSTBUEHEL OBSERVATORY [ZEITHALTUNG UND AUSGEWAEHLTE METHODEN DES TERRESTRIESCHEN ZEITVERGLEICHS AM BEISPIEL DER ZEITSTATION DES OBSERVATIRIUMS LUSTBUEHEL]
D. Kirchner Dec. 1982 221 p refs In GERMAN; ENGLISH summary
(INW-8205) Avail: NTIS HC A10/MF A01

The problems involved in generating and maintaining stable time scales, and time and frequency comparison are treated. The history of the various definitions of time, both the astronomical and the atomic time scales is presented. A definition of the concept of stability and its measure, and the most common precision frequency standards and their properties are given. The most important terrestrial methods of time and frequency comparison are demonstrated. A time keeping station and the time scale generated with it are described. Author (ESA)

N83-33672# Los Alamos Scientific Lab., N. Mex.
CURRENT DIFFUSION IN RAIL-GUN CONDUCTORS
J. F. Kerrisk Jun. 1982 18 p refs Sponsored by DOE
(DE82-018318; LA-9401-MS) Avail: NTIS HC A02/MF A01

A method was developed to analyze one and two dimensional, nonlinear current diffusion in rail-gun conductors. A nonlinear current-diffusion equation that accounts for the temperature dependence of electrical conductivity has been developed from Maxwell's equations. A finite-difference heat-transfer computer program was adapted to solve the current-diffusion and thermal-diffusion problems for rail-gun conductors in one and two dimensions. The nonlinear current-diffusion equation was als extended to account for the magnetic-field dependence of the magnetic permeability, thus allowing ferromagnetic materials to be considered. A one dimensinal finite-difference technique was developed for ferromagnetic materials. Two one dimensional test problems that compare results with other analyses are discussed. A series of calculations of current density and rail temperature was done for various size rectangular rails. One analysis of current diffusion in a ferromagnetic material was also performed. Author

71 ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see *45 Environment Pollution.*

N83-33673# National Physical Lab., Teddington (England).
UNCERTAINTIES IN REALISING THE STANDARD OF SOUND PRESSURE BY THE CLOSED COUPLER RECIPROCITY TECHNIQUE
M. E. Delany and E. N. Bazley Jan. 1982 63 p refs
(NPL-AC-99; ISSN-0143-7143) Copyright. Avail: Issuing Activity

Sources of uncertainty associated with realizing the standard of sound pressure using one-inch laboratory standard microphones calibrated by the closed coupler reprocity technique are discussed. A measurement technique designed to achieve an unacceptable level of uncertainty is described and the components of systematic and random uncertainities in the range 63 Hz to 12.5 kHz are given. With suitable microphones, the overall systematic uncertainty of calibration is estimates to be less than 0.025 dB at frequencies up to 1 kHz, increasing to 0.11 dB at 10 kHz. Author

N83-33674 ESDU International Ltd., London (England).
THE CORRECTION OF MEASURED NOISE SPECTRA FOR THE EFFECTS OF GROUND REFLECTION, AMENDMENT A
Nov. 1981 63 p refs
(ESDU-80038-Amend-A; ISBN-0-85679-321-3; ISSN-0307-0115) Avail: ESDU

This data item is an addition to the Noise Subseries. A means of estimating the effect of the sound wave reflected from the ground surface on the measured noise signal is provided. The basic method applies to discrete frequency sound propagating through a still-uniform atmosphere over a flat ground plane. The impedance of the ground surface is calculated using a porous absorber model. Guidance is given on the choice of a value of specific flow resistance for a range of surfaces. The possible ways of minimizing ground reflection effects by the suitable choice of microphone height are discussed. Data are provided in graphical

form for one-third octave band sound levels and two microphone heights. Computer program listings (in FORTRAN and BASIC) are provided for both discrete frequency and one-third octave bands and any microphone heights. In the program an option is given to correct for source position and timing errors in the location of the frequency of the first ground reflection hollow. Also an allowance may be made for the characteristic of the filters used to analyze the measured data. ESDU

N83-33675 ESDU International Ltd., London (England).
FREE VIBRATION OF THIN-WALLED, ORTHOGONALLY STIFFENED, CIRCULAR-CYLINDRICAL SHELLS, AMENDMENTS A AND B
Dec. 1981 70 p refs
(ESDU-80040-Amend-A/B; ISBN-0-85679-323-X; ISSN-0141-3916) Avail: ESDU

This Data Item is an addition to the Acoustic Fatigue Subseries. Model data are provided for circular cylindrical, uniform shells with either uniform stringer stiffeners or uniform ring stiffeners, or a combination of both types of stiffener, which can be modelled as homogeneous orthotropic shells. Such modeling is usually applicable when the stringers are unformly and closely pitched around the shell circumference and the rings are uniformly and closely pitched along the shell longitudinal axis. The data provided should be used as guidelines to practical shell natural frequencies and mode shapes. Listings of computer programs in BASIC and FORTRAN IV are provided for the estimation of the lower natural frequencies, and associated mode shapes, of the flexural modes of vibration of ring and stringer stiffened circular cylindrical shells. A means of estimating the torsional natural frequencies and mode shapes for orthogonally stiffened shells is also given. The data provided are applicable to initially unstressed shells or to shells having initial stress due to static axial or pressure loading. All combinations of clamped shear diaphragm and free shell end conditions are considered. ESDU

N83-33676 ESDU International Ltd., London (England).
NATURAL FREQUENCIES OF THICK-WALLED ISOTROPIC CIRCULAR-CYLINDRICAL SHELLS. (SHEAR DIAPHRAGM END CONDITIONS)
Aug. 1981 37 p refs Sponsored in part by the Royal Aeronautical Society
(ESDU-81018; ISBN-0-85679-348-5; ISSN-0141-3916) Avail: ESDU

This Data Item is an addition to the Acoustic Fatigue Subseries. Graphical data and a computer program listing (BASIC programming language) for the estimation of the lower natural frequencies of thick-walled isotropic, circular cylinders based on the three-dimensional theory of elasticity for hollow cylinders are provided. The data on both flexural and torsional vibrations are applicable to initially unstressed, isotropic shells having shear diaphragm end conditions. The geometric parameters and mode numbers for which the differences between natural frequency given by the three-dimensional elastic theory and thin-shell theory are more than 1 per cent and 5 per cent are indicated. General information is given on the flexural and torsional modes of free vibration of thick-walled shells. ESDU

N83-33677 ESDU International Ltd., London (England).
AN INTRODUCTION TO AIRCRAFT NOISE LATERAL ATTENUATION
Nov. 1981 9 p Sponsored in part by the Ministry of Defence and the Royal Astronautical Society
(ESDU-81035; ISBN-0-85679-368-X; ISSN-0307-0115) Avail: ESDU

This Data Item is an addition to the Noise Subseries. Guidance on the estimation of lateral attenuation of aircraft noise from noise measurements is given. Lateral attenuation is defined as the difference between the under the flightpath and sideline free field levels where the propagation range of the two sound levels is the same. A knowledge of aircraft noise lateral attenuation is required for the evaluation of ground noise levels. ESDU

N83-33678 ESDU International Ltd., London (England).
SOUND IN LOW VELOCITY VENTILATION DUCTS
Jul. 1982 29 p refs
(ESDU-81043; ISBN-0-85679-376-0; ISSN-0141-4011) Avail: ESDU

This Data Item is an addition to the Fluid Mechanics Internal Flow Subseries. Essential data for estimating the change in acoustical energy as sound propagates through a ventilating system is provided. From a knowledge of this sound energy, the sound pressure level which results on any room served by the system may be estimated. From consideration of the estimated sound pressure levels in the most sensitive areas of the building the amount of silencing required in the system to achieve acceptable sound levels can be assessed. Data are provided in either graphical or tabular form for the estimation of the attenuation of sound in ducts and duct fittings and for the estimation of the sound generated as air flows through standard duct fittings. A means of estimating the octave band sound pressure levels due to the air-conditioning system in a room is also given. Other factors which effect sound in ventilation ducts (e.g., breakout) are discussed. ESDU

N83-33679 ESDU International Ltd., London (England).
EXAMPLE TO ILLUSTRATE THE USE OF DATA ITEMS ON NOISE FROM DUCTED VENTILATION AND AIR-CONDITIONING SYSTEMS
Dec. 1982 25 p
(ESDU-82003; ISBN-0-85679-420-1; ISSN-0141-4011) Avail: ESDU

This Data Item is an addition to the Wind Engineering Subseries. By means of an example, the application of data provided in ESDU 79037, 81043, 82001, and 82002 for the estimation of sound pressure levels resulting from the operation of a ducted ventilation system within a room served by that system is illustrated. The example calculation considers a typical office ventilation system and discusses possible ways of reducing the flow generated noise in order to meet the noise design criteria. The data are intended for use by engineers who are not acoustic specialists. ESDU

N83-33680 ESDU International Ltd., London (England).
ESTIMATION OF LATERAL ATTENUATION OF AIR-TO-GROUND JET OR TURBOFAN AIRCRAFT NOISE IN ONE-THIRD OCTAVE BANDS
Nov. 1982 78 p refs
(ESDU-82027; ISBN-0-85679-408-2; ISSN-0307-0115) Avail: ESDU

This Data Item is an addition to the Noise Subseries. The free-field values of one-third octave band lateral attenuation for air-to-ground airplane noise are estimated. Lateral attenuation is defined as the difference between the under-the-flightpath and sideline free-field levels where the propagation distance of the two sound levels is the same. Data are particularly applicable for the estimation of ground noise levels of turbo-fan powered aircraft. The range of applicability includes sideline noise-levels for turbo-fan and jet powered aircraft when the aircraft's elevation angle, relative to an observer at the sideline location, is greater than five degrees, the wind speed is less than 6 meters/sec and there are no temperature inversions. Guidance is given on the procedure that should be used to estimate sideline noise levels. ESDU

N83-33681*# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
A METHOD TO DETERMINE THE ACOUSTICAL PROPERTIES OF LOCALLY AND NONLOCALLY REACTING DUCT LINERS IN GRAZING FLOW Final Report
G. Succi Hampton, Va. NASA. Langley Research Center Jun. 1982 30 p refs
(Contract NAS1-16521)
(NASA-CR-165983; NAS 1.26:165983) Avail: NTIS HC A03/MF A01 CSCL 20A

The acoustical properties of locally and nonlocally reacting acoustical liners in grazing flow are described. The effect of mean flow and shear flow are considered as well as the application to rigid and limp bulk reacting materials. The axial wavenumber of

the least attenuated mode in a flow duct is measured. The acoustical properties of duct liners is then deduced from the measured axial wavenumber and known flow profile and boundary conditions. This method is a natural extension of impedance-like measurements. Author

N83-33682*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A LABORATORY STUDY OF THE PERCEIVED BENEFIT OF ADDITIONAL NOISE ATTENUATION BY HOUSES
Ian H. Flindell Jun. 1983 58 p refs
(NASA-TM-85647; NAS 1.15:85647) Avail: NTIS HC A04/MF A01 CSCL 20A

Two Experiments were conducted to investigate the perceived benefit of additional house attenuation against aircraft flyover noise. First, subjects made annoyance judgments in a simulated living room while an operative window with real and dummy storm windows was manipulated in full view of those subjects. Second, subjects made annoyance judgments in an anechoic audiometric test chamber of frequency shaped noise signals having spectra closely matched to those of the aircraft flyover noises reproduced in the first experiment. These stimuli represented the aircraft flyover noises in levels and spectra but without the situational and visual cues present in the simulated living room. Perceptual constancy theory implies that annoyance tends to remain constant despite reductions in noise level caused by additional attenuation of which the subjects are fully aware. This theory was supported when account was taken for a reported annoyance overestimation for certain spectra and for a simulated condition cue overreaction. Author

N83-33683*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Mechanical Engineering.
EXPERIMENTAL STUDY OF THE THERMAL-ACOUSTIC EFFICIENCY IN A LONG TURBULENT DIFFUSION-FLAME BURNER Final Report
J. R. Mahan Washington NASA Aug. 1983 74 p refs
(Contract NAG3-124)
(NASA-CR-3725; NAS 1.26:3725) Avail: NTIS HC A04/MF A01 CSCL 20A

An acoustic source/propagation model is used to interpret measured noise spectra from a long turbulent burner. The acoustic model is based on the perturbation solution of the equations describing the unsteady one-dimensional flow of an inviscid ideal gas with a distributed heat source. The model assumes that the measured noise spectra are due uniquely to the unsteady component of combustion heat release. The model was applied to a long cylindrical hydrogen burner operating over a range of power levels between 4.5 kW and 22.3 kW. Acoustic impedances at the inlet to the burner and at the exit of the tube downstream of the burner were measured and are used as boundary conditions for the model. These measured impedances are also presented. Author

N83-33684*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
INVESTIGATION OF JET-INSTALLATION NOISE SOURCES UNDER STATIC CONDITIONS
John G. Shearin Aug. 1983 33 p refs
(NASA-TP-2181; L-15599; NAS 1.61:2181) Avail: NTIS HC A03/MF A01 CSCL 20A

The acoustical effects of operating a 6-cm exit-diameter nozzle in the presence of a wing-flap model under static conditions are examined experimentally. The geometric parameters of the wing-flap model are chosen to represent a realistic jet-engine installation on a wide-body midrange transport airplane. The effects of varying the installation parameters and the noise sources associated with the engine-installation effects are discussed. The major noise sources are the flow interaction of the jet and wing undersurface, the flow interaction of the jet with the side edges of the flap cutout and flap trailing edge, and the reflection of the jet noise off the undersurface of the wing and flap. Author

N83-33685# Pennsylvania State Univ., University Park. Center for Air Environment Studies.
RESEARCH ON ACOUSTICALLY GENERATED TURBULENCE
Rajiv Tiwary 8 Dec. 1982 88 p refs
(Contract DE-AC21-81MC-16359)
(DE83-012121; CAES-673-83) Avail: NTIS HC A05/MF A01

The physical processes associated with the accustic agglomeration of fine particulates are very complex with the relative motion of the particles being the result of many interacting factors. One of these factors is the random motion of the gaseous medium resulting from fluid turbulence. Any turbulence in the velocity field will result in a turbulent diffusion process which will then enhance coagulation. The hydrodynamic turbulence associated with high Reynolds number flows is of course well known and understood. Several reseachers have investigated the effect of pulsating flows on the appearance of significant turbulence. Research just completed indicates that although increasing levels of turbulence are generated as acoustic levels increase into the range of 165 db, the ratio of turbulent energy to acoustic energy is about 10(+3) for frequencies from 1000 Hz to 3500 Hz. The research was performed in a 0.3 by 0.6 by 0.025 m rectangular chamber resulting in dispersive acoustic fields. The cause of the turbulence was the acoustic streaming which resulted in a very low frequency turbulence. The interaction of this low frequency turbulence with the acoustic velocities at the fundamental of the excitation frequency and harmonics resulted in a broadening of the bases of the pure tone components of the spectra in only a few locations of the space in the chamber. DOE

N83-33686# Centro Informazioni Studi Esperienze, Milan (Italy). Documentation Service.
ACOUSTIC EMISSION MONITORING DURING PRESSURE VESSEL HYDROTEST
F. Tonolini 1983 26 p refs Presented at OECD/IAEA Specialist Meeting on Defect Detection and Sizing, Ispra, Italy, 3-6 May 1983
(Contract ENEL-CISE-ISEA-2E/000)
(CISE-2037) Avail: NTIS HC A03/MF A01

For acoustic emission (AE) monitoring during pressure vessel hydrotests, the characterization of the AE associated to the process of subcritical crack growth in structural steel was studied in notched specimens of ductile steel during fracture mechanics tests. Count rate of the AE events, their peak amplitude distribution, and time intervals between events were analyzed. Peak amplitude distribution is confirmed to be the parameter most sensitive to crack growth. The tests show good AE source location capability even for complicated geometries. All the significant AE concentrated sources are systematically correlated to ultrasonic reflectors. No misinterpretation of the results emerges and no interference with operation schedule is caused. Author (ESA)

N83-33687# Southampton Univ. (England). Inst. of Sound and Vibration Research.
[ACTIVITIES OF THE INSTITUTE OF SOUND AND VIBRATION RESEARCH] Annual Report
1983 45 p refs
Avail: NTIS HC A03/MF A01

Research in fluid dynamics and acoustics, vehicle noise, audiology and human effects, industrial noise, and noise and vibration control is summarized. Aircraft noise, underwater acoustics, damping of fiber reinforced materials and finite element methods are discussed. Author (ESA)

N83-32977 Polish Academy of Sciences, Warsaw.
DEPARTMENT OF PHYSICAL ACOUSTICS
In its Sci. Activities of the Polish Acad. of Sci. 1983 p 69-79
(For primary document see N83-32969 21-31)
Avail: Issuing Activity

N83-32978 Polish Academy of Sciences, Warsaw.
DEPARTMENT OF ULTRASONICS
In its Sci. Activities of the Polish Acad. of Sci. 1983 p 80-87

(For primary document see N83-32969 21-31)
Avail: Issuing Activity

N83-32979 Polish Academy of Sciences, Warsaw.
DEPARTMENT OF CYBERNETIC ACOUSTICS
In its Sci. Activities of the Polish Acad. of Sci. 1983 p 88-100
(For primary document see N83-32969 21-31)
Avail: Issuing Activity

N83-32980 Polish Academy of Sciences, Warsaw.
DEPARTMENT OF AEROACOUSTICS
In its Sci. Activities of the Polish Acad. of Sci. 1983 p 101-106
(For primary document see N83-32969 21-31)
Avail: Issuing Activity

N83-32981 Polish Academy of Sciences, Warsaw.
DEPARTMENT OF ACOUSTOELECTRONICS
In its Sci. Activities of the Polish Acad. of Sci. 1983 p 107-117
(For primary document see N83-32969 21-31)
Avail: Issuing Activity

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N83-33688# Istituto Superiore di Sanita, Rome (Italy). Lab. di Fisica.
REFRESHER COURSE ON IONIZING RADIATION METROLOGY AND DOSIMETRY, PART 2 [CORSO DI AGGIORNAMENTO IN METROLOGIA E DOSIMETRIA DELLE RADIAZIONI IONIZZANTI, PARTE 2]
4 Oct. 1982 222 p refs In ITALIAN; ENGLISH summary Course held in Rome, 2-5 Mar. 1982 2 Vol.
(ISS-L-82/6-Pt-2; ISSN-0390-6493) Avail: NTIS HC A10/MF A01

Dosimetry in radiotherapy and nuclear medecine, the use of particle accelerators, radiation protection, standards and regulations, dose received and use of radioactive tracers were discussed. For individual titles, see N83-33689 through N83-33697.

N83-33689# Istituto Nazionale di Fisica Nucleare, Rome (Italy).
THE USE OF PARTICLE ACCELERATION MACHINES IN RADIOTHERAPY: A REVIEW [IMPIEGO DELLE MACCHINE ACCELERATRICI IN RADIOTERAPIA]
C. Bosio and M. Pelliccioni *In* Ist. Superiore di Sanita Refresher Course on Ionizing Radiation Metrology and Dosimetry, Pt. 2 4 Oct. 1982 42 p refs In ITALIAN (For primary document see N83-33688 21-72)
Avail: NTIS HC A10/MF A01

The effects of the dosage and the oxygen enhancement ratio when using particle accelerators in radiotherapy are discussed. The advantages derived from the Bragg peak effect and pion mass to energy conversion are commented on. Machines to produce electrons, X rays, protons, neutrons, heavy ions and negative pions are described. The good results observed in the case of negative pions can be attributed either to the favorable dose distribution or to the specific biological properties of the particles produced in the process of pion capture. The cost factors of the generating machines are also discussed. Author (ESA)

N83-33690# Istituto Superiore di Sanita, Rome (Italy).
DOSIMETRY OF PHOTON RADIATION BEAMS FOR TELERADIOTHERAPY [DOSIMETRIA PER FASCI DI RADIAZIONE FOTONICA PER TELERADIOTERAPIA]
Sergio Belletti ((Ospedale Civili-Brescia, Italy) *In its* Refresher Course on Ionizing Radiation Metrology and Dosimetry, Pt. 2 4 Oct. 1982 20 p ref In ITALIAN (For primary document see N83-33688 21-72)
Avail: NTIS HC A10/MF A01

Photon beam dosimetric methods are analyzed in relation to the measurement errors, utilization flexibility and preferential applications. The radiation type used in teleradiotherapy are either a gamma source (60 Co or 137 Cs) or X rays from accelerated electrons up to 45 MeV. The ion metering method, the chemical method, the thermoluminescence method and the photodensimetry method are considered. Procedures to evaluate dose distribution are reported, defining quality factors such as the transversal dose variations and the amplitude of the zone in which the dose changes from 85% to 15%. The advantages resulting from the use of particle accelerators are shown. Author (ESA)

N83-33691# Istituto Superiore di Sanita, Rome (Italy).
DOSIMETRY OF ELECTRON BEAMS IN TELERADIOTHERAPY [DOSIMETRIA PER FASCI DI ELETTRONI IN TELERADIOTERAPIA]
Giampiero Tosi (Ospedale Niguarda-Ca'Granada, Milan) *In its* Refresher Course on Ionizing Radiation Metrology and Dosimetry, Pt. 2 4 Oct. 1982 30 p refs In ITALIAN (For primary document see N83-33688 21-72)
Avail: NTIS HC A10/MF A01

The dosimetry of electron beams from 5 to 45 MeV is discussed including the measurement of the threshold energy by photonuclear reactions, the measurement of the maximum electron path, length, the measurement of the energy spectrum after a given penetration, the determination of the absorbed dose, the application of the Fe SO4 solution dosimeter, the measurement of beam homogeneity and materials for human tissue simulation. Author (ESA)

N83-33692# Florence Univ. (Italy). Ist. di Fisica Medica.
STANDARDIZATION OF DOSIMETRY IN RADIOTHERAPY [STANDARDIZZAZIONE DELLA DOSIMETRIE IN RADIOTERAPIA]
R. Renzi *In* Ist. Superiore di Sanita Refresher Course on Ionizing Radiation Metrology and Dosimetry, Pt. 2 4 Oct. 1982 26 p In ITALIAN Sponsored by CNR (For primary document see N83-33688 21-72)
Avail: NTIS HC A10/MF A01

Dose error sources in radiotherapy applications are analyzed and classified as source parameter errors, patient dose distribution evaluation errors and practical execution errors. The organization of the Italian dosimetry services is described, including regulations and standard procedures. An accuracy level of 3% is deemed compatible with present technology for the case of source measurements. Author (ESA)

N83-33693# Istituto Superiore di Sanita, Rome (Italy).
RADIATION PROTECTION ASPECTS IN RADIOTHERAPY [ASPETTI RADIOPROTEZIONISTICI IN RADIOTERAPIA]
F. Milanesi *In its* Refresher Course on Ionizing Radiation Metrology and Dosimetry, Pt. 2 4 Oct. 1982 25 p In ITALIAN (For primary document see N83-33688 21-72)
Avail: NTIS HC A10/MF A01

The general philosophy of radiation protection is discussed with reference to the Italian regulations at national and regional levels. Particular aspects of radioprotection in the cases of teletherapy sources, radiosurgery and metabolic radiotherapy are examined. Author (ESA)

N83-33694# Istituto Nazionale di Fisica Nucleare, Frascati (Italy).
RADIATION PROTECTION FOR LINEAR ACCELERATORS [RADIOPROTEZIONE INTORNO A UN ACCELERATORE LINEARE]
Maurizio Pelliccioni *In* Ist. Superiore di Sanita Refresher Course on Ionizing Radiation Metrology and Dosimetry, Pt. 2 4 Oct. 1982 21 p refs In ITALIAN (For primary document see N83-33688 21-72)
Avail: NTIS HC A10/MF A01

The radiation risk for the personnel working near a linear accelerator, mainly constituted by X-rays, is discussed, and the safety equipment and procedures are reviewed. Data on X-ray and neutron data observed in the proximity of a linear accelerator are presented. Shield design materials are examined and data on their efficiency are given. Background and personnel dosimetry are also discussed. Author (ESA)

N83-33695# Istituto Superiore di Sanita, Rome (Italy).
PRESENT SITUATION OF THE CLINICAL UTILIZATION OF RADIOACTIVE TRACERS [SITUAZIONE ATTUALE DELL'IMPIEGO CLINICO DEI TRACCIANTI RADIOATTIVI]
Remo Masi *In its* Refresher Course on Ionizing Radiation Metrology and Dosimetry, Pt. 2 4 Oct. 1983 20 p refs In ITALIAN (For primary document see N83-33688 21-72)
Avail: NTIS HC A10/MF A01

The utilization of radioactive tracers in Italy with a clinical scope is examined. Geographic distribution of clinical centers, legislation, disposal of radioactive wastes, personnel, equipment available, operation mode and prospectives are discussed. Deficiencies in equipment, personnel and choice of diagnosis methods are shown. Author (ESA)

N83-33696# Comitato Nazionale per l'Energia Nucleare, Rome (Italy).
CRITERIA FOR THE ORGANIZATION OF A PROGRAM TO MONITOR INTERNAL CONTAMINATION [CRITERI PER L'ORGANIZZAZIONE DI UN PROGRAMMA PER LA SORVEGLIANZA FISICA DELLA CONTAMINAZIONE INTERNA]
L. Frittelli *In* Ist. Superiore di Sanita Refresher Course on Ionizing Radiation Metrology and Dosimetry, Pt. 2 4 Oct. 1982 16 p In ITALIAN (For primary document see N83-33688 21-72)
Avail: NTIS HC A10/MF A01

Primary and secondary limits of internal radioactive contaminations are defined. Formulas for different cases are given, including exposure to a mixture of radioactive isotopes and noble gases, with various introduction paths. Metabolic process related to radionuclides metabolism are reviewed. The computations of the secondary limits and the reference levels are discussed.
Author (ESA)

N83-33697# Istituto Superiore di Sanita, Rome (Italy).
EVALUATION OF PATIENT'S DOSE DURING INVESTIGATIONS WITH RADIOACTIVE TRACERS [VALUTAZIONE DELLA DOSE AL PAZIENTE NEL CORSO DI INDAGINI CON TRACCIANTI RADIOATTIVI]
Renato Palumbo (Ospedale Generale Regionale, Perugia, Italy), Gianni Gobbi (Ospedale Generale Regionale Perugia, Italy), and Maria Pia Leogrande (Ospedale Generale Regionale, Perugia, Italy) *In its* Ist. Superiore di Sanita Refresher Course on Ionizing Radiation Metrology and Dosimetry, Pt. 2 4 Oct. 1982 13 p refs In ITALIAN (For primary document see N83-33688 21-72)
Avail: NTIS HC A10/MF A01

The dose received is defined in function of the half life of the radioactive material and the biological half life (transit time in the body). The Loevingen and Berinan equations to compute the activity in a target organ due to the activity in a source organ are reviewed. The biokinetics of radioactive drugs is discussed. The influence of patient age is examined. A radionuclide with a half life of hours, a high percentage of gamma radiation between 100 and 200 KeV and a low emission of non penetrating radiation is suggested. The effect of impurities on the dose absorbed is shown from experimental data. Author (ESA)

N83-33698# United Technologies Research Center, East Hartford, Conn.
BOTANICAL RELAXATION STUDIES OF HYDROGEN FLUORIDE Final Report
J. J. Hinchen and R. H. Hobbs Nov. 1982 33 p refs
(Contract F49620-81-C-0011; AF Proj. 2303)
(AD-A128384; UTRC/R82-955423; AFOSR-83-0432TR) Avail: NTIS HC A03/MF A01 CSCL 20/8

Laser double resonance experiments in HF were extended to probing levels as high as J=13 to define the processes of population transfer between rotational levels and transfer from vibration to rotation. In the first part of this report rotational transfer experiments are described and the results are compared with three different kinetic models. Using the criteria of transfer rates and signal shapes for evaluation, the Polyani-Woodall model was found to best describe the data. The second part of the report describes observations of direct transfer of vibrational (V=1) transfer to rotational levels J=10-13 of V=0. Very fast transfer by this route was measured but only a small fraction of the V=1 population was involved. Dilution of the HF sample by rare gases was found to enhance V-R transfer in accord with observations reported for rotational HF lasers. GRA

N83-33699# California Univ., Livermore. Lawrence Livermore Lab.
MICROFIELD DISTRIBUTION FOR DEGENERATE ELECTRONS
David B. Boercker and James W. Dufty (Florida Univ., Gainesville) Jul. 1982 16 p refs Presented at the 6th Intern. Conf. on Spectral Line Shapes, Boulder, Colo., 12-16 Jul. 1982
(Contract W-7405-eng-48)
(DE82-019103; UCRL-87858; CONF-8206102-2) Avail: NTIS HC A02/MF A01

The quantum microfield distribution is defined for the electron electric field distribution in a grand canonical ensemble. The definition is general, allowing for description of the distribution at a charged or neutral point and applies for the electron Coulomb field (high frequency microfield) or shielded field (low frequency microfield). By analogy with the Baranger-Mozer cluster expansion for the classical case a cluster expansion for the microfield distribution is defined. The cluster series is resumed to closed form for the case of no interactions, to define a quantum Holtsmark distribution. In this way the problem is reduced to a one electron calculation. The usual classical result is verified in the limit of z much less than 1; the large and small field behavior is determined for arbitrary degeneracy. DOE

N83-33700# Brookhaven National Lab., Upton, N. Y. Physics Dept.
MATTER-ANTIMATTER OSCILLATIONS AND NEUTRINO MASS
Goran Senjanovic 1982 21 p refs Presented at the Neutrino Conf., Telemark, Wisc., 23-25 Sep. 1982
(Contract DE-AC02-76CH-00016)
(DE83-005144; BNL-32378; CONF-820971-3) Avail: NTIS HC A02/MF A01

A discussion of neutron-antineutron (n anti n) and hydrogen-antihydrogen (H- anti H) transitions is presented. An SU(2)/sub L/ x U(1) x SU(3)/sub c/ model with spontaneously broken global B-L symmetry is shown to predict the interesting connection between oscillation times T/sub n- anti n/, T/sub H- anti H/, neutrino mass and the mass of a doubly charged Higgs scalar. A case of B-L as a gauge symmetry is discussed in the context of SU(2)/ sub L/ x SU(2)/sub R/ x U(1)/sub B-L/ x SU(3)/sub c/ gauge model, with the emphasis on matter oscillations. Finally, an analysis of Higgs mass scales in GUTS and their impact on such processes is offered. DOE

N83-33701# Georgia Univ., Athens. Dept. of Physics.
HIGH ENERGY HADRON-HADRON COLLISIONS Annual Progress Report
T. T. Chou Jan. 1983 15 p refs
(Contract DE-AS09-76ER-00946)
(DE83-006237; DOE/ER-00946/6) Avail: NTIS HC A02/MF A01

Work on high energy hadron-hadron collisions in the geometrical model is summarized. Specific items that were studied last year include the multiplicity fluctuation and KNO scaling in anti pp collider experiments, comparison of geometrical model predictions of the elastic slope parameters with data from CERN anti pp Collider and ISR, the existence of dips in the t-distribution for elastic hadron-hadron collisions, and the inclusive particle spectra in the quark recombination model. DOE

N83-33702# California Univ., Berkeley. Lawrence Berkeley Lab.
BASIS FOR CALCULATIONS IN THE TOPOLOGICAL EXPANSION Thesis
Mark Alan Levinson Dec. 1982 109 p
(Contract DE-AC03-76SF-00098)
(DE83-005930; LBL-15407) Avail: NTIS HC A06/MF A01

Investigations aimed at putting the topological theory of particles on a more quantitative basis are described. First, the

incorporation of spin into the topological structure is discussed and shown to successfully reproduce the observed lowest mass hadron spectrum. The absence of parity-doubled states represents a significant improvement over previous efforts,in similar directions. This theory is applied to the lowest order calculation of elementary hadron coupling constant ratios. SU(6)/sub W/ symmetry is maintained and extended via the notions of topological supersymmetry and universality. Finally, efforts to discover a perturbative basis for the topological expansion are described. This has led to the formulation of off-shell Feynman-like rules which provide a calculational scheme for the strong interaction components of the topological expansion once the zero-entropy connected parts are known. These rules are shown to imply a topological asymptotic freedom. DOE

N83-33703# Argonne National Lab., Ill. Applied Physics Div.
LEAST-SQUARES METHOD FOR DERIVING REACTION DIFFERENTIAL-CROSS-SECTION INFORMATION FROM MEASUREMENTS PERFORMED IN DIVERSE NEUTRON FIELDS
Donald L. Smith Nov. 1982 62 p refs
(Contract W-31-109-eng-38)
(DE83-005642; ANL/NDM-77) Avail: NTIS HC A04/MF A01

A generalized least squares algorithm which refines a prior multigroup energy differential neutron reaction cross section evaluation by addition of new experimental data is described. Complete covariance information for the prior evaluation and for the new experimental information is required in this procedure. The result is a revised best estimate multigroup cross section evaluation with complete covariance information. The algorithm tests the consistency of the new and apriori information, and it readily indicates whether the new data significantly improve the knowledge of the differential cross section. These new data need not be specific differential cross sections. Therefore, the experimenter is not limited to measurements which involve only conventional monoenergetic techniques. This opportunity suggests exploration of diverse new experimental methods, e.g., ones which can exploit the high yield and favorable neutron energy ranges offered by certain unconventional neutron sources which have received little past attention. DOE

N83-33704# Los Alamos Scientific Lab., N. Mex.
COMPUTATIONAL METHODS OF ELECTRON/PHOTON TRANSPORT
Joseph M. Mack 1983 14 p refs Presented at the Am. Nucl. Soc. Topical Conf. on Computational Methods, Salt Lake City, 28-31 Mar. 1983
(Contract W-7405-eng-36)
(DE83-004739; LA-UR-82-3583; CONF-830304-9) Avail: NTIS HC A02/MF A01

A review of computational methods simulating the nonplasma transport of electrons and their attendant cascades is presented. Remarks are mainly restricted to linearized formalisms at electron energies above 1 keV. The effectiveness of various methods is discussed including moments, point kernel, invariant imbedding, discrete ordinates, and Monte Carlo. Future research directions and the potential impact on various aspects of science and engineering are indicated. DOE

N83-33705# Los Alamos Scientific Lab., N. Mex. Applied Theoretical Physics Div.
STREAMING-MATRIX HYBRID METHOD FOR DISCRETE-ORDINATES CALCULATIONS
Bradley A. Clark 1983 17 p refs Presented at the Am. Nucl. Soc. Topical Conf. on Computational Methods, Salt Lake City, 28-31 Mar. 1983
(Contract W-7405-eng-36)
(DE83-004811; LA-UR-82-3602; CONF-830304-6) Avail: NTIS HC A02/MF A01

The streaming matrix hybrid method (SMHM) is a deterministic streaming method applied in void regions within a discrete ordinates problem. The SMHM is used within the discrete ordinates space angle sweeping scheme so that it remains inside the standard discrete ordinates inner iteration procedure. Streaming matrix equations are derived from the integral transport equation; a brief description of the implementation of the SMHM in discrete ordinates transport codes is presented. The SMHM is applied to a cylindrical duct problem (L/D = 10) and compared with discrete ordinates and Monte Carlo solutions. The SMHM provides more accurate results than discrete ordinates without undue run time or storage penalties. DOE

N83-33706# Brookhaven National Lab., Upton, N. Y.
NEUTRINO OSCILLATIONS
D. H. White 1982 17 p refs Presented at 2nd LAMPF Workshop, N. Mex., 19 Jul. 1982
(Contract DE-AC02-76CH-00016)
(DE83-002210; BNL-31948; CONF-820745) Avail: NTIS HC A02/MF A01

The interest in neutrino oscillations is such that there are several experiments approved or planned for the near future. There are experiments already complete which have searched for oscillations particularly between nu sub mu yields nu sub e. Accelerator experiments and the principal limitations on the experimental sensitivity to changes in neutrino flavor are discussed. A critical review of the methodology that has been used or proposed for accelerator experiments is given. DOE

N83-33707# Los Alamos Scientific Lab., N. Mex.
RADIOLOGICAL HAZARDS OF ALPHA-CONTAMINATED WASTE
John C. Rodgers 1982 31 p refs Presented at the Alpha-Contaminated Waste Management Meeting, Gaithersburg, Md., 10 Aug. 1982
(Contract W-7405-eng-36)
(DE83-001978; LA-UR-82-3001; CONF-820845-4) Avail: NTIS HC A03/MF A01

The radiological hazards of alpha-contaminated wastes are discussed in this overview in terms of two components of hazard: radiobiological hazard, and radiobiological hazard, and radioecological hazard. Radiobiological hazard refers to human uptake of alpha-emitters by inhalation and ingestion, and the resultant dose to critical organs of the body. Radioecological hazard refers to the processes of release from buried wastes, transport in the environment, and translocation to man through the food chain. Besides detailing the sources and magnitude of hazards this brief review identifies the uncertainties in their estimation, and implications for the regulatory process. DOE

N83-33708# California Univ., Berkeley. Lawrence Berkeley Lab. Nuclear Science Div.
NUCLEAR MOMENTS OF INERTIA AT HIGH SPIN
M. A. Deleplanque Oct. 1982 23 p refs Presented at the High Angular Momentum Properties of Nuclei Conf., Oak Ridge, Tenn., 2-4 Nov. 1982
(Contract DE-AC03-76SF-00098)
(DE83-003591; LBL-15162; CONF-821143-2) Avail: NTIS HC A02/MF A01

The competition between collective motion and alignment at high spin can be evaluated by measuring two complementary dynamic moments of inertia. The first, I band, measured in gamma-gamma correlation experiments, relates to the collective properties of the nucleus. A new moment of inertia I/sub eff/ is defined here, which contains both collective and alignment effects. Both of these can be measured in continuum gamma ray spectra of rotational nuclei up to high frequencies. The evolution of gamma ray spectra for Er nuclei from mass 160 to 154 shows that shell effects can directly be observed in the spectra of the lighter nuclei. DOE

N83-33709# California Univ., Berkeley. Lawrence Berkeley Lab. Nuclear Science Div.
HEAVY ION PION PRODUCTION: SPECTRAL IRREGULARITIES
John O. Rasmussen Sep. 1982 16 p refs Presented at the Intern. Conf. on Nucleus-Nucleus Collisions, East Lansing, Mich.,

26 Sep. - 1 Oct. 1982
(Contract DE-AC03-76SF-00098)
(DE83-002564; LBL-14956; CONF-820979-3) Avail: NTIS HC A02/MF A01

Data on pi(-)/pi(+) ratios and on hills and valleys in spectra from heavy ion collisions are reviewed. Theoretical studies to handle Coulomb effects on pion spectra are examined. The possible role of strongly bound pion orbitals of nuclear size is discussed. DOE

N83-33710# California Univ., Berkeley. Lawrence Berkeley Lab. Nuclear Science Div.
PIONS FROM AND ABOUT HEAVY IONS
John O. Rasmussen Sep. 1982 22 p refs Presented at the Summer School on Nucl. Dyn., Victoria, BC, 22 Aug. 1982
(Contract DE-AC03-76SF-00098)
(DE83-003550; LBL-14852; CONF-820899-1) Avail: NTIS HC A02/MF A01

A review is presented of the possibilities of pion production with heavy ion reactions. Major headings include: pion thermometry; hills and valleys in pion spectra; pionic orbits of nuclear size; pion confinement in the fireball; anomalons; and Schroedinger equation solutions for pionic atoms. DOE

N83-33711# Iowa State Univ. of Science and Technology, Ames.
MOLECULAR-BEAM PHOTOIONIZATION STUDIES OF MOLECULES AND THEIR VANDERWAALS CLUSTERS Ph.D. Thesis
Yoshi Ono Jul. 1982 228 p refs
(Contract W-7405-eng-82)
(DE83-004967; IS-T-1009) Avail: NTIS HC A11/MF A01

A new photoionization apparatus incorporating a supersonic molecular beam, a quadrupole mass spectrometer and a 3-meter vacuum ultraviolet monochromator were used to study the nitric oxide, carbon disulfide, carbonyl sulfide and acetylene molecules along with their van der Waals clusters. Using a wavelength resolution of 0.14 A (FWHM), photoionization efficiency curves were obtained for NO, CS2, OCS, and C2H2 in the respective threshold regions and ionization energy determinations accurate to within 3 MeV were made. The autoionization structures resolved led to new interpretations and assignments to Rydberg levels. Photoionization efficiency data for the clusters were obtained under lower resolution, typically 1.4 A (FWHM) and led to binding energy determintion of the cluster ions. Other thermochemical values were deduced from fragment appearance energies and sharp rises in ionization efficiencies. DOE

N83-33712# Fermi National Accelerator Lab., Batavia, Ill.
RF DEVICE FOR PRECISION LOCATION OF THE BEAM-POSITION DETECTORS IN THE ENERGY SAVER
Q. A. Kerns, G. H. Biallas, F. Turkot, R. C. Webber, and A. Wehmann Mar. 1983 4 p refs
(Contract DE-AC02-76CH-03000)
(DE83-012013; FERMILAB-TM-1187) Avail: NTIS HC A02/MF A01

The Task is to measure the center line of the beam detector with respect to the magnetic centerline with a precision of +-0.2 mm; the measurement must be made on 250 magnets (they come in 6 lengths, from 25' to 99') by a technician. Optical, mechanical, and electrical techniques for carrying out this procedure were considered. An RF device operating at 53 MHZ was adopted for the following reasons: (a) it provides complete electrical checkout of the hardware at operating frequency, including the bidirectional operation of the pickup, (b) no mechanical contact with the strip lines is required, and (c) the demands of production measurements and maintenance of calibration are better matched to the skills of an average technician. We describe the conceptual design, fabrication, and performance of this device. DOE

N83-33713# Brookhaven National Lab., Upton, N. Y.
MONOCHROMATIC RADIO FREQUENCY ACCELERATOR CAVITY
Salvatore Giordano 1983 4 p Presented at the Particle Accelerator Conf., Santa Fe, N. Mex., 21-23 Mar. 1983
(Contract DE-AC02-76CH-00016)
(DE83-011653; BNL-32658; CONF-830311-122) Avail: NTIS HC A02/MF A01

In circular accelerators and storage rings it is important that any device placed in the beam line be relatively free of spurious resonances. Accelerating RF cavities inherently have an infinite number of spurious modes. The cavity to be described in this paper makes use of certain geometric construction configurations that eliminate all the spurious modes. A cavity was constructed with an accelerating TMolo mode of 90 MHz. Measurements showed that the TMolo mode was essentially unchanged from a conventional cavity but all modes up to 3 GHz were either completely eliminated or reduced by a least 30 db. DOE

N83-33714# Fermi National Accelerator Lab., Batavia, Ill.
MAGNETIC MONOPOLE BIBLIOGRAPHY, 1981-1982
R. E. Craven and W. P. Trower (Virginia Polytechnic Inst. and State Univ.) Mar. 1983 33 p
(Contract DE-AC02-76CH-03000)
(DE83-010927; FERMILAB-82/92) Avail: NTIS HC A03/MF A01

These last two years have again seen an increase in activity centered on the mgnetic monopole concept. It has been motivated by the growing confidence in Grand Unified Theories, GUTs, and encouraged by a Stanford experiment reporting a single, uncorroborated monopole candidate event. The non-agelian gauge ideas of t hooft and polyakov now provide monopoles a secure home. It is the variety and behavior of monopoles in these theories which have recently attracted so much attention. With the realization that the GUT monopole would be a layered object, increasing in unification with decreasing radius, several exotic prospects for these monopoles came under discussion - baryon catalysis and monopolium. In the first interaction, a monopole which has wandered through matter, invaded a nucleus, and enveloped a proton in its electro-weak unification region, may induce proton decay. Moving on, after a suitable recovery period, it can perform the same function on its next such encounter. Although the theory of this process is still far from agreed upon, some observational evidence from neutron star X-rays places severe limits on the abundance of free monopoles, the strength of the catalysis process, or both. DOE

N83-33715# Washington Univ., Seattle. Dept. of Physics.
PARITY NONCONSERVATION IN THE HYDROGEN ATOM Ph.D. Thesis
Timothy Edward Chupp 1983 252 p refs
(Contract DE-AC06-81ER-40048)
(DE83-011458; DOE/ER-40048/44-L2) Avail: NTIS HC A12/MF A01

The development of experiments to detect parity nonconserving (PNC) mixing of the 2 s sub a 2 and 2 p sub 1/2 levels of the hydrogen atom in a 570 Gauss magnetic field is described. The techniques involves observation of an asymmetry in the rate of microwave induced transitions at 1608 MHz due to the interference of two amplitudes, one produced by applied microwave and static electric fields and the other produced by an applied microwave field and the 2 s sub 1/2 2p sub 1/2 mixing induced by a parity nonconservation Hamiltonian. DOE

N83-33716# Mission Research Corp., Albuquerque, N. Mex.
PARTICLE SIMULATIONS OF COLLECTIVE EFFECTS IN HIGH-CURRENT ACCELERATORS
J. W. Poukey (Sandia National Labs.), T. P. Hughes, B. B. Godfrey, and M. M. Campbell 1983 5 p refs Presented at the Particle Accelerator Conf., Santa Fe, N. Mex., 21 Mar. 1983 Sponsored in part by AFWL
(Contract DE-AC04-76DP-00789)
(DE83-011281; SAND-83-0559C; CONF-830311-110) Avail: NTIS HC A02/MF A01

Particle simulation codes in two and three dimensions have become a standard theoretical tool in the study of many aspects of high current (kA range) accelerators. Some of the recent results obtained with these codes in the area of linear induction acceleration of electron beams are reviewed. In particular, considerable

progress is reported in the understanding of beam generation, oscillation control, accelerating-gap-induced instabilities, and extraction through a foil from a guide magnetic field. DOE

N83-33717# Brookhaven National Lab., Upton, N. Y. Accelerator Dept.
SUPERCONDUCTIVITY AND FUTURE ACCELERATORS
G. T. Danby and J. W. Jackson 1983 4 p refs Presented at the Particle Accelerator Conf., Santa Fe, N. Mex. 21-23 Mar. 1983
(Contract DE-AC02-76CH-00016)
(DE83-010441; BNL-32806; CONF-830311-85) Avail: NTIS HC A02/MF A01

Particle accelerators employing accelerating cavities and deflecting magnets and new accelerator concepts and hardware yielding great improvements in performance and GeV per dollar are discussed. The great idea for collective acceleration resulting from intense auxiliary charged-particle beams or laser light may or may not be just around the corner. In its absence, superconductivity (SC) applied both to RF cavities and to magnets opened up the potential for very large accelerators without excessive energy consumption and with other economies, even with the CW operation desirable for colliding beams. High energy physics has aggressively pioneered this new technology: the Fermilab single ring 1 TeV accelerator - 2 TeV collider is near the testing stage. Brookhaven National Laboratory's high luminosity pp 2 ring 800 GeV CBA collider is well into construction. Other types of superconducting projects are in the planning stage with much background R and D accomplished. The next generation of hadron colliders under discussion involves perhaps a 20 TeV ring (or rings) with 40 TeV CM energy. This is a very large machine: even if the highest practical field B approx. 10T is used, the radius is 10x that of the Fermilab accelerator. DOE

N83-33718# California Univ., Livermore. Lawrence Livermore Lab.
ADVANCED TEST ACCELERATOR (ATA), A 50 MeV, 10 kA INDUCTION LINAC
L. L. Reginato 1983 6 p refs Presented at the Particle Accelerator Conf., Santa Fe, N. Mex., 21-23 Mar. 1983
(Contract W-7405-eng-48)
(DE83-009314; UCRL-88877; CONF-830311-11) Avail: NTIS HC A02/MF A01

The ATA is an induction accelerator designed to produce 70 ns pulses of electrons at currents of 10 kA and energies in excess of 50 MeV. The accelerator is capable of operating at an average rate of 5 Hz or at 1 kHz for ten pulses. The parameters were chosen primarily to provide the experimental basis for advancing the understanding of electron beam propagation physics. The 85 m accelerator has been under construction for the past four years and has adopted mainly an improved version of the ETA technology to satisfy the required parameters. Initial operation of the facility and the energy conversion system from primary power to axial electric field will be described; recent advances in magnetic switching which have been incorporated in the innector will also be discussed. DOE

N83-33719# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
MEASUREMENT OF FINE STRUCTURE RESOLVED DIFFERENTIAL SCATTERING CROSS SECTIONS FOR COLLISIONS BETWEEN POTASSIUM AND MERCURY WITH PARTICLE-PHOTON COINCIDENCE TECHNIQUE Thesis [MESSUNG FEINSTRUKTURAUFGELOESTER DIFFERENTIELLER STREUQUERSCHNITTE FUER STOESSE VON KALIUM AND QUECKSILBER MITTELS TEILCHEN-PHOTON-KOINZIDENZ]
H. Huebner Dec. 1982 93 p refs In GERMAN
(MPIS-15/1982; ISSN-0436-1199) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 16,95

An experiment was set up in order to determine the fine structure cross sections for collision processes between potassium and mercury, using the particle-photon coincidence technique. A fast potassium beam crosses a thermal mercury beam, and the scattered particles in coincidence with the emitted photons are observed. The differential cross sections are measured for the 4p(super2)p1/2 and 4p(super 2)p3/2 excited K-states. Both fine structures show a similar evolution. A cross section calculation based on a semiclassical two-state model shows a clear deviation from the Duren pseudopotentials which are not valid for small distances between nuclei. Author (ESA)

N83-33720# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
COLLISIONS OF LASER-EXCITED ATOMS FOR THE DETERMINATION OF THE POTENTIAL OF THE SYSTEMS K(4SUPER2P) - Ne, Ar, Kr, Xe Thesis [STOESSE LASERANGEREGTER ATOME ZUR POTENTIALBESTIMMUNG FUER DIE SYSTEME K(4SUPER2P)-Ne, Ar, Kr, Xe]
H. Tischer Dec. 1982 92 p refs In GERMAN
(MPIS-16/1982; ISSN-0436-1199) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 16,80

Total differential scattering cross sections were measured for the collision process of K-atoms in the 4(super2)P state with noble gas atoms in order to determine the potentials of the collisional systems. A single dye laser was used for excitation. In the domain of large scattering angles, a rainbow structure due to potassium scattering is found in the difference signals of the scattering intensities for all systems. A theoretical formulation of the scattering calculation is presented. The experimental data agree with the calculated scattering cross sections. Author (ESA)

N83-33721# Centro Informazioni Studi Esperienze, Milan (Italy). Documentation Service.
DISTRIBUTION OF THERMAL NEUTRONS IN A TEMPERATURE GRADIENT [DISTRIBUZIONE DI NEUTRONI TERMICI IN UN GRADIENTE DI TEMPERATURA]
V. G. Molinari (Bologna Univ.) and L. Pollachini 1983 58 p refs In ITALIAN Presented at Sem. Nazl. sulla Fis. del Reattore e Teoria del Trasporto, Bologna, 4 Mar. 1983
(CISE-2014) Avail: NTIS HC A04/MF A01

A method to determine the spatial distribution of the thermal spectrum of neutrons in heterogeneous systems is presented. The method is based on diffusion concepts and has a simple mathematical structure which increases computing efficiency. The application of this theory to the neutron thermal diffusion induced by a temperature gradient, as found in nuclear reactors, is described. After introducing approximations, a nonlinear equation system representing the neutron temperature is given. Values of the equation parameters and its dependence on geometrical factors and media characteristics are discussed. Author (ESA)

N83-33722# Istituto Superiore di Sanita, Rome (Italy). Lab. di Fisica.
REFRESHER COURSE ON IONIZING RADIATION METROLOGY AND DOSIMETRY, PART 1 [CORSO DI AGGIORNAMENTO IN METROLOGIA E DOSIMETRIA DELLE RADIAZIONE IONIZZANTI, PARTE 1]
4 Oct. 1982 238 p refs In ITALIAN; ENGLISH summary Course held in Rome, 2-5 Mar. 1982 2 Vol.
(ISS-L-82/5-Pt-1; ISSN-0390-6493) Avail: NTIS HC A11/MF A01

Dosimetry techniques, the theoretical principles of thermoluminescence, neutron flux measurement, metrology of ionizing radiation, statistical analysis of dose distribution, radiation standards and radiation laboratory organization were discussed. For individual titles, see N83-33723 through N83-33733.

N83-33723# Politecnico di Milano (Italy).
INTRODUCTION TO INDIVIDUAL DOSIMETRY METHODS [INTRODUZIONE ALLE DIVERSE METODICHE DI DOSIMETRIA INDIVIDUALE]
Sergio Terrani *In* Ist. Superiore di Sanita Refresher Course on Ionizing Radiation Metrology and Dosimetry, Pt. 1 4 Oct. 1982 6 p In ITALIAN (For primary document see N83-33722 21-72)
Avail: NTIS HC A11/MF A01

The requirements for monitors measuring the radiation dose

to which persons are exposed are discussed. The characteristics of thermoluminiscent dosimeters, photoluminiscent dosimeters, ionographic dosimeters (only for neutrons), pen dosimeters and film-badges are discussed. It is shown that no single type is entirely satisfactory. Author (ESA)

N83-33724# Comitato Nazionale per l'Energia Nucleare, Bologna. (Italy). Lab. Fisica Sanitaria.
STANDARDIZATION OF INDIVIDUAL DOSIMETRIC SYSTEMS [NORMALIZZAZIONE DEI SISTEMA DOSIMETRICI INDIVIDUALI]
A. Cavallini *In* Ist. Superiore di Sanita Refresher Course on Ionizing Radiation Metrology and Dosimetry, Pt. 1 4 Oct. 1983 33 p In ITALIAN (For primary document see N83-33722 21-72)
Avail: NTIS HC A11/MF A01

The activities of an Italian operating group for the standardization of individual dosimeters are discussed. Intercalibration was performed for about 10,000 individual dosimeters in order to analyze systematic and random measuring errors. The validity of normalized inspection procedures was examined and the necessity of periodic checks was considered. Legislation is proposed including a technical inspection prior to authorization to start a dosimetry center and a norm for periodic controls of dosimetry services. The creation of a dosimetric data bank is also suggested. Author (ESA)

N83-33725# Istituto Superiore di Sanita, Rome (Italy).
THEORETICAL PRINCIPLES OF THE THERMOLUMINESCENCE [PRINCIPI TEORICI DELLA TERMOLUMINESCENZA]
C. Furetta *In its* Refresher Course on Ionizing Radiation Metrology and Dosimetry, Pt. 1 4 Oct. 1982 16 p In ITALIAN (For primary document see N83-33722 21-72)
Avail: NTIS HC A11/MF A01

An energy band model in an isolator material (LiF type) is used to explain thermoluminescence. Theoretical glow curves obtained using first and second order kinetics are compared. The physical significance of the kinetic order is shown. The Mayhugh model and the Nink and Kos model which interpret the thermoluminescence mechanisms in the LiF are described. Author (ESA)

N83-33726# Comitato Nazionale per l'Energia Nucleare, Bologna (Italy). Lab. di Fisica Sanitaria.
RADIOTHERMOLUMINESCENCE: CHARACTERISTICS AND PRACTICAL APPLICATIONS [LA RADIOTHERMOLUMINESCENZA: CARATTERISTICHE ED APPLICAZIONI PRATICHE]
G. Busuoli *In* Ist. Superiore di Sanita Refresher Course on Ionizing Radiation Metrology and Dosimetry, Pt. 1 4 Oct. 1982 51 p refs In ITALIAN (For primary document see N83-33722 21-72)
Avail: NTIS HC A11/MF A01

The theory and the requirements of dosimeters based on thermoluminescence are described. Commercial dosimeters are listed indicating base material and activator agent. Thermal clearing procedures are discussed, noting the complexity of the treatment necessary in the case of LiF materials. The relative response at different photon energy levels is shown for different base materials. Qualitative information, fading data, and neutron sensitivity data are also presented. The applications to individual dosimetry, clinical dosimetry, environmental dosimetry, ultraviolet radiation dosimetry and archaeological dating are examined.
Author (ESA)

N83-33727# Comitato Nazionale per l'Energia Nucleare, Bologna (Italy). Lab. Fisica Sanitaria.
INDIVIDUAL DOSIMETRY FOR NEUTRON RADIATION FIELDS [DOSIMETRIA INDIVIDUALE PER CAMPI DI RADIAZIONE NEUTRONICA]
Luciano Lembo *In* Ist. Superiore di Sanita Refresher Course on Ionizing Radiation Metrology and Dosimetry, Pt. 1 4 Oct. 1982 12 p In ITALIAN (For primary document see N83-33722 21-72)
Avail: NTIS HC A11/MF A01

Neutron dosimetry techniques used in a dosimetric center are discussed, including film individual dosimetry for slow and fast neutrons, albedo individual dosimetry with either thermoluminescent detectors or alpha particle tracer detectors, and alpha tracer detectors using the CR-39 commercial reticulated polymer. The technique using the CR-39 is found to be easy to use, low cost and has a low neutron energy threshold. Author (ESA)

N83-33728# Istituto Superiore di Sanita, Rome (Italy).
STATISTICS OF THE DOSES ABSORBED BY WORKERS [STATISTICA SULLE DOSI ASSORBITE DAI LAVORATORI]
A. Parisi *In its* Refresher Course on Ionizing Radiation Metrology and Dosimetry, Pt. 1 4 Oct. 1982 17 p refs In ITALIAN (For primary document see N83-33722 21-72)
Avail: NTIS HC A11/MF A01

A statistical analysis of the distribution of the doses by individual workers is presented to assess existing norms. A log-normal distribution is assumed for the individual doses. A reference distribution is introduced, characterized by log-normal distribution of annual doses, average 0,5 rem (10% of the limit) and 0.1% of the individuals that will absorb more than 5 rem. Expressions are given for the probability of finding a dose in a given interval and for the fraction of the collective dose due to doses from a given interval. An example using data from medical professions in the United States shows that the fraction of workers with annual doses larger than 5 rem is not contained within the 0.1% recommended limit, and that the level of risk is not uniform between professions. Author (ESA)

N83-33729# Politecnico di Torino (Italy). Ist. di Elettronica e Telecomunicazioni.
THE ORGANIZATION OF THE ITALIAN CALIBRATION SERVICE [ORGANIZZAZIONE DEL SERVIZIO ITALIANO DI TARATURA] **c31**
Claudio Egidi *In* Ist. Superiore di Sanita Refresher Course on Ionizing Radiation Metrology and Dosimetry, Pt. 1 4 Oct. 1982 20 p refs In ITALIAN (For primary document see N83-33722 21-72)
Avail: NTIS HC A11/MF A01

The calibration service is formed by a network of secondary calibration centers, usually forming part of an industrial organization, which are authorized to operate under the supervision of a committee presided by an industry representative. The interactions with other calibration services, particularly those of European countries are discussed. At the end of 1981, 16 centers operated in Italy. Information regarding the type of measurement possible in each center is given. Author (ESA)

N83-33730# Ferrara Univ. (Italy). Ist. di Fisica Generale.
PROSPECTIVE OF MAGNITUDES AND PRIMARY SAMPLES OF IONIZING RADIATION UNITS [LE PROSPETTIVE DELLE GRANDEZZE E DEI CAMPIONI PRIMARI DELLE UNITA' DE MISURA PER LE RADIAZIONE IONIZZANTI]
E. Casnati, A. Tartari, and C. Baraldi *In* Ist. Superiore di Sanita Refresher Course on Ionizing Radiation Metrology and Dosimetry, Pt. 1 4 Oct. 1982 29 p refs In ITALIAN (For primary document see N83-33722 21-72)
Avail: NTIS HC A11/MF A01

Uncertainties in the measurement of radiation effects in radiotherapy, radiography, laboratory diagnosis and biophysics of ionizing radiation are discussed. It is shown that the quantitative knowledge of the atomic parameters which describe the absorption of energy by matter and the activation of evolutive processes in biosystems is the main factor involved. Author (ESA)

N83-33731# Comitato Nazionale per l'Energia Nucleare, Casaccia (Italy). Lab. di Metrologia delle Radiazioni Ionizzanti.
NEUTRON PRIMARY SAMPLING [I CAMPIONI PRIMARI DI NEUT RONI]
E. Rotondi *In* Ist. Superiore di Sanita Refresher Course on Ionizing Radiation Metrology and Dosimetry, Pt. 1 4 Oct. 1982 19 p refs In ITALIAN (For primary document see N83-33722 21-72)
Avail: NTIS HC A11/MF A01

Difficulties related to neutron dosimetry are discussed. The principles of construction of ionization chambers with human tissue equivalence and the calorimetric method to measure neutron dosage are described. Sampling of a source neutron flux by the

MnSO4 solution method, sampling of thermal neutron flux density (neutrons slowed down by graphite or polyethylene), and the sampling of monoenergetic fast neutron flux are examined in detail. Author (ESA)

N83-33732# Istituto Superiore di Sanita, Rome (Italy). Lab. delle Radiazioni.
PRIMARY STANDARDS FOR THE MEASUREMENT OF EXPOSURE [GLI STANDARD PRIMARI PER LA MISURA DELL'ESPOSIZIONE]
A. Bartolotta and L. Pugliani *In its* Refresher Course on Ionizing Radiation Metrology and Dosimetry, Pt. 1 4 Oct. 1982 24 p refs In ITALIAN (For primary document see N83-33722 21-72)
Avail: NTIS HC A11/MF A01

Radiation exposure is defined and differentiated from dosage. The general characteristics of free air ionization chambers are described. The design details of the chamber are given. Corrections necessary to compute exposure are discussed. The exposure is given as the ratio of capacity-voltage to aperture area-electrode length, corrected by 10 factors which are defined. Author (ESA)

N83-33733# Comitato Nazionale per l'Energia Nucleare, Bologna (Italy). Lab. di Fisica Sanitaria.
THE EXPERIENCE ACQUIRED IN THE ORGANIZATION OF A SECONDARY STANDARDS LABORATORY [ESPERIENZE ACQUISITE NELL'ORGANIZZAZIONE DI UN LABORATORIO PER STANDARD SECONDARI]
Luciano Lembo *In* Ist. Superiore di Sanita Refresher Course on Ionizing Radiation Metrology and Dosimetry, Pt. 1 4 Oct. 1982 11 p In ITALIAN (For primary document see N83-33722 21-72)
Avail: NTIS HC A11/MF A01

The requirements to install a secondary standards radiation laboratory are defined and the details of the implementation of such a laboratory are given including the characteristics and location of X-ray sources, Co-60 sources and neutron sources. The instrumentation is described. The equipment for secondary standardization in beta and neutronic fields is also mentioned. Data from calibrating experiments are given. Author (ESA)

N83-33734# Centre National de la Recherche Scientifique, Orleans (France). Laboratoire de Physique et Chimie de l'Environnement.
THE PHENOMENA INDUCED BY CHARGED PARTICLE BEAMS (PICPAB) EXPERIMENT: PLASMA POTENTIAL FLUCTUATION PROBE (P3F) [EXPERIENCE PICPAB: P3F]
J. L. Michau Jan. 1983 130 p refs In FRENCH
(LPCE-NT-4) Avail: NTIS HC A07/MF A01

An electrostatic probe which qualitatively follows plasma potential variations during a Spacelab particle accelerator experiment is presented. Three reference modes for the accelerators are envisaged: general mass of the space shuttle (non-floating mode); active package mass (floating); and using energy filter analyzer and suprathermal electron spectrometer measures. Simulation results show that the probe is satisfactory, and improves as plasma density increases. Acceptable results are obtained for densities > 4.6 hundred billion/cum. Author (ESA)

N83-33735# New Mexico State Univ., Las Cruces. Dept. of Physics.
MEASUREMENT OF THE SPIN-SPIN CORRELATION PARAMETER C SUB LL (THETA) IN PROTON-PROTON SCATTERING Thesis
Sidney Jay Stuart Los Alamos, N. Mex. Los Alamos Scientific Lab. Aug. 1982 57 p refs Sponsored by DOE
(DE83-000462; LA-9504-T) Avail: NTIS HC A04/MF A01

The experimental procedures and methods of data analysis used to measure the spin-spin correlation parameters C sub LL (0) in proton-proton scattering at thirteen different energies in the range 300 to 800 MeV are presented. The results compare favorably with previous data. Good agreement is found with phase shift predictions at energies below 500 MeV. Author (GRA)

N83-33647# Kyoto Univ. (Japan). Dept. of Physics.
SYSTEMATIC STUDY ON THE ELASTIC SCATTERING OF 65 MeV POLARIZED PROTONS
Harutaka Sakaguchi *In* Kyoto Univ. Mem. of the Fac. of Sci., Kyoto Univ., Ser. of Phys., Astrophys., Geophys. and Chem., Vol. 36, No. 2 Mar. 1983 p 305-341 refs (For primary document see N83-33643 21-70)
Avail: NTIS HC A09/MF A01

N83-33657# Tokyo Denki Univ. (Japan).
BACK-SCATTERING OF ELECTRONS IN A NON-EQUILIBRIUM HIGH ELECTRIC FIELD
Mikio Ohuchi and Tadahiro Kubota *In its* Res. Repts. of the Fac. of Eng., Tokyo Denki Univ., No. 30 Dec. 1982 p 1-10 refs In JAPANESE; ENGLISH summary (For primary document see N83-33656 21-70)
Avail: NTIS HC A08/MF A01

N83-33661# Tokyo Denki Univ. (Japan).
MOLECULAR ORBITAL CONSIDERATIONS ON HYDROGEN BOND ENERGY AND ELECTRONIC PROPERTIES OF 2-PYRIDONE-2-AMINOPYRIDINE COMPLEX
Kozo Inuzuka and Akira Fujimoto *In its* Res. Repts. of the Fac. of Eng., Tokyo Denki Univ., No. 30 Dec. 1982 p 65-76 refs In JAPANESE; ENGLISH summary (For primary document see N83-33656 21-70)
Avail: NTIS HC A08/MF A01

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation.*

N83-33736# Rockwell International Corp., Richland, Wash. Energy Systems Group.
GEOLOGIC, GEOCHEMICAL ROCK MECHANICS AND HYDROLOGIC CHARACTERISTICS OF CANDIDATE REPOSITORY HORIZONS
P. E. Long, M. J. Apted, F. A. Spane, Jr., and K. Kim Sep. 1982 19 p refs Presented at NWTS Inform. Meeting on Basalt Isolation Project, Las Vegas, Nev., 14 Dec. 1982
(Contract DE-AC06-77RL-01030)
(DE83-001491; RHO-BW-SA-252-P; CONF-821205-17) Avail: NTIS HC A02/MF A01

The feasibility of constructing a nuclear waste repository in basalt (NWRB) on the Hanford Site is determined. Studies conducted indicate feasibility and performance requirements are within a significant safety margin. The two most promising candidate repository horizons for an NWRB are the middle Sentinel Bluffs and the Umtanum flows. Both of these flows are laterally continuous and have thicknesses of competent rock adequate to accommodate a repository. Significant geologic differences between the two flows are their depth, total thickness, and variability of flow top thickness. These differences are considered in selection of one of the two flows for breakout from an exploratory shaft. The geochemical characteristics of both the middle Sentinel Bluffs flow and the Umtanum flow favor long term isolation of radionuclides by providing an environment in which canister corrosion rates and solubility of many radionuclide bearing solids is relatively low. DOE

N83-33737# Rockwell International Corp., Richland, Wash. Energy Systems Group.
BASALT WASTE ISOLATION PROJECT SITE ISSUES AND PLANS FOR THEIR RESOLUTION
S. M. Price and G. C. Evans Sep. 1982 19 p refs Presented at NWTS Inform. Meeting on Basalt Waste Isolation Project, Las Vegas, Nev., 14 Dec. 1982
(Contract DE-AC06-77RL-01030)
(DE83-001492; RHO-BW-SA-245-P; CONF-821205-15) Avail:

NTIS HC A02/MF A01

The Basalt Waste Isolation Project completed preparation and submittal to the US Nuclear Regulatory Commission of the project's Site Characterization Report. The document, in addition to containing a comprehensive review of the status of site selection and characterization activities at the Hanford Site, contains a detailed analysis of the status of work aimed at meeting proposed regulatory criteria for a nuclear waste repository in basalt. DOE

N83-33738# Rockwell International Corp., Richland, Wash. Energy Systems Group.

BASALT WASTE ISOLATION PROJECT WASTE PACKAGE AND SITE GEOCHEMISTRY ISSUES AND PLANS FOR THEIR RESOLUTION

H. Babad Sep. 1982 19 p refs Presented at NWTS Inform. Meeting on Basalt Waste Isolation Project, Las Vegas, Nev., 14 Dec. 1982

(Contract DE-AC06-77RL-01030)

(DE83-001485; RHO-BW-SA-246-P) Avail: NTIS HC A02/MF A01

The Basalt Waste Isolation Project completed preparation and submittal to the US NRC of the project's Site Characterization Report. This document, in addition to containing a comprehensive review of the status of site election and characterization activities at Hanford, contains a detailed analysis of the status of work aimed at meeting proposed regulatory criteria for a nuclear waste repository in basalt. DOE

N83-33739# Los Alamos Scientific Lab., N. Mex.

A NEW GENERATION OF REACTORS FOR SPACE POWER

Jay E. Boudreau and David Buden 1982 52 p Presented at the Committee on Advanced Nuclear Systems Symp. on Advan. Reactor Systems, Washington, D.C., 15-17 Nov. 1982

(Contract W-7405-eng-36)

(DE83-003574; LA-UR-82-3315; CONF-821148-2) Avail: NTIS HC A04/MF A01

Space nuclear reactor power is expected to power many new space missions that will require several times to several orders of magnitude anything flown in space to date. Power in the 100-kW range may be required in high Earth orbit spacecraft and planetary exploration. The baseline design for this particular nuclear subsystem technology is described; additionally, reactor technology is reviewed from previous space power programs, a preliminary assessment is made of technology candidates covering an extended power spectrum, and the status is given of other reactor technologies. DOE

N83-33740# Oak Ridge National Lab., Tenn. Environmental Sciences Div.

GEOLOGICAL AND PETROLOGICAL CONSIDERATIONS RELEVANT TO THE DISPOSAL OF RADIOACTIVE WASTES BY HYDRAULIC FRACTURING: AN EXAMPLE AT THE US DEPARTMENT OF ENERGY'S OAK RIDGE NATIONAL LABORATORY

C. Stephen Haase 1982 13 p refs Presented at the 6th Intern. Symp. on the Sci. Basis for Radioactive Waste Management, Boston, 1 Nov. 1982

(Contract W-7405-eng-26)

(DE83-003417; CONF-821107-31) Avail: NTIS HC A02/MF A01

At Oak Ridge National Laboratory the Pumpkin Valley Shale is used as a host formation for hydraulic fracturing waste disposal. Determination of the relationship between the distribution of different lithologies and porosity permeability trends within this host formation allows these properties, important to hydraulic fracturing operations, to be related to measurable and mappable geological and petrological parameters. It also permits extrapolation of such patterns to little studied portions of the Pumpkin Valley Shale. Such knowledge better allows for the satisfactory operation and assessment of the hydraulic fracturing at Oak Ridge National Laboratory. DOE

N83-33741# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.

DIRECTIONS IN LOW-LEVEL RADIOACTIVE-WASTE MANAGEMENT. TRANSPORTING LOW-LEVEL WASTE: EFFECTS OF REGIONAL MANAGEMENT

Nov. 1982 12 p refs

(Contract DE-AC07-76ID-01570)

(DE83-004448; DOE/LLW-6Tb) Avail: NTIS HC A02/MF A01

The beneficial effects that regional management can have on transporting low-level radioactive wastes is discussed. Locations of the three currently operating disposal sites - one each in South Carolina, Washington, and Nevada - are widely dispersed and far from the sources of much of the nation's low-level waste. Establishment of regionally located sites would effectively reduce the distance, cost, and hazards of transport. Cited analytic work provides quantitive support of this appraisal. This information is intended, primarily, to assist state officials - executive, legislative, and agency - in the management of commercial low-level radioactive waste. DOE

N83-33742# Baker (Michael, Jr.), Inc., Beaver, Pa.

ENGINEERING EVALUATION OF PROJECTED SOLID-WASTE-DISPOSAL PRACTICES. VOLUME 2: CASE STUDIES Final Report

J. C. Hayward, E. H. Rothfuss, Jr., W. J. Flick, T. S. Hawk, and J. A. Quay Sep. 1982 308 p refs Sponsored by EPRI

(EPRI Proj. 1728-1)

(DE83-900629; EPRI-CS-2627-Vol-2) Avail: NTIS HC A14/MF A01

Estimates of the cost impacts of the Resource Conservation and Recovery Act (RCRA) for hazardous and non-hazardous large volume waste classification scenarios on eight power plants was presented. Seven of the power plants were chosen to represent the range of waste management technologies and disposal site conditions existing in the United States today. The eighth site was a fictitious site used to further evaluate the feasibility of ocean disposal of large volume utility wastes. For each site, the professional design team acted in the role of a consultant retained by the utility to bring its waste disposal program into complete compliance with RCRA. First, a conceptual design was developed for each scenario. Then, cost estimates were developed for both scenarios, as well as for current operations. The cost estimates for current operations were performed in order to show the base cases necessary to determine RCRA's cost impacts. DOE

N83-33743# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Geotechnical Lab.

TESTS FOR EVALUATING SITES FOR DISPOSAL OF LOW-LEVEL RADIOACTIVE WASTE

R. J. Lutton, D. K. Butler, R. B. Meade, D. M. Patrick, A. B. Strong, and H. M. Taylor, Jr. Dec. 1982 172 p

(DE83-901083; NUREG/CR-3038) Avail: NTIS HC A08/MF A01; also available from GPO $6.50

The tests and other means of evaluating or documenting the important characteristics of sites for disposal of low level radioactive waste are identified. More than half of the tests and procedures are standard methods recognized and used nationwide, most conspicuously the numerous chemical tests. Other tests are commonly used methods recognized widely as state of the art, e.g., geological and geophysical methods. The basis for choosing these state of the art methods is discussed, and the concept and procedures themselves are reviewed in the absence of standards for ready reference. Besides standards and state of the art practices a third category of methods involves the use of existing data sources or recognized correlations in place of new testing or documentation. It is particularly important that mapping, logging, sampling, testing, interpretation, and analysis be conducted by technically qualified and professionally motivated personnel using appropriate equipment and facilities, and general guidance is provided in this direction. DOE

N83-33744# Pacific Northwest Lab., Richland, Wash.

OVERVIEW OF THE MONITORED RETRIEVABLE STORAGE (MRS) PROGRAM

D. E. Rasmussen Aug. 1982 7 p Presented at the ANS Topical

Meeting: Spent Fuel Storage, Savannah, 26-28 Sep. 1982
(Contract DE-AC06-76RL-01830)
(DE83-002738; PNL-SA-10649; CONF-820943-7) Avail: NTIS HC A02/MF A01

The current objective of the DOE MRS/Interim Storage program is to ensure that the Government has the capability to accept and store high-level waste and spent fuel in the amounts and on a schedule determined by DOE goals for nuclear energy, legislation and regulations. Preliminary studies are complete and development of the concepts, with commercial sector involvement, is about to start. Spent fuel and high-level waste storage requirements for the reference case indicate minimum interim storage requirements if start of commercial reprocessing and repository availability remain on schedule. DOE

N83-33745# Los Alamos Scientific Lab., N. Mex.
SPACE REACTORS Progress Report, Oct. 1981 - Mar. 1982
William A. Ranken, comp. Jan. 1983 79 p refs
(Contract W-7405-eng-36)
(DE83-008278; LA-9598-PR) Avail: NTIS HC A05/MF A01

Progress in design studies and technology for the SP-100 Project - successor to the Space Power Advanced Reactor (SPAR) Project - is reported for the period October 1, 1981 to March 31, 1982. The basis for selecting a high-temperature, UO2-fueled, heat-pipe-cooled reactor with a thermoelectric conversion system as the 100/kW-sub e/ reference design has been reviewed. Although no change has been made in the general concept, design studies have been done to investigate various reactor/conversion system coupling methods and core design modifications. Thermal and mechanical finite element modeling and three dimensional Monte Carlo analysis of a core with individual finned fuel elements are reported. Studies of unrestrained fuel irradiation data are discussed that are relevant both to the core modeling work and to the design and fabrication of the first in-pile irradiation test, which is also reported. Work on lithium-filled core heat pipe development is described, including the attainment of 15.6 kW/sub t/ operation at 1525 K for a 2-m-long heat pipe with a 15.7-mm outside diameter. The successful operation of a 5.5-m-long, lightweight potassium/titanium heat pipe at 760 K is described, and test results of a thermoelectric module with GaP-modified SiGe thermoelectric elements are presented. DOE

N83-33746# Florida Inst. of Tech., Melbourne.
SPACE NUCLEAR POWER AND MAN'S EXTRATERRESTRIAL CIVILIZATION
Joseph J. Angelo and David Buden (Los Alamos Lab, N. Mex.) 1983 24 p Presented at the 20th Space Congr., Cocoa Beach, Fla., 26-28 Apr. 1983
(Contract W-7405-eng-36)
(DE83-007561; LA-UR-83-449; CONF-830421-1) Avail: NTIS HC A02/MF A01

This paper examines leading space nuclear power technology candidates. Particular emphasis is given the heat-pipe reactor technology currently under development at the Los Alamos National Laboratory. This program is aimed at developing a 10-100 kWe, 7-year lifetime space nuclear power plant. As the demand for space-based power reaches megawatt levels, other nuclear reactor designs including: solid core, fluidized bed, and gaseous core, are considered. DOE

N83-33654# Nagoya Univ. (Japan). Dept. of Nuclear Engineering.
REACTOR PHYSICS CONSTANTS FOR THE MEDIUM ENRICHED-URANIUM CORE OF KYOTO UNIVERSITY CRITICAL ASSEMBLY
Susumu Wakamatsu and Kojiro Nishina *In* Nagoya Univ. Mem. of the Fac. of Eng., Nagoya Univ., Vol. 34, No. 1 May 1982 p 125-138 refs (For primary document see N83-33650 21-70)
Avail: NTIS HC A07/MF A01

74 OPTICS

Includes light phenomena.

N83-33747*# Maryland Univ., College Park. Dept. of Physics and Astronomy.
AN EVALUATION OF AN ICCD IMAGER OF DYNAMIC RANGE EXPANSION TECHNIQUE AND APPLICATION OF INSITU PROCEDURES FOR LIFE-TIME EXTENSION
Douglas G. Currie 22 Feb. 1982 61 p
(Contract NAS5-24305)
(NASA-CR-170555; NAS 1.26:170555) Avail: NTIS HC A04/MF A01 CSCL 20F

Research toward practical implementation of the Intensified Charge Coupled Device (ICCD) as a photon-counting array detector for astronomy is reported. The first area of concentration was to determine the rate and extent of the lifetime limiting damage to the CCD caused by the impact of high energy electrons, and to find whether various methods of annealing the damage were productive. The second effort was to determine the performance of the ICCD in a photon-counting mode to produce extended dynamic range measurements. There are two main effects that appear as the practical results of the electron damage to the CCD. One is an increase in the leakage current, i.e., the normal thermal generation of charge carriers in the silicon that provides a background dark signal that adds to the light produced image. In an undamaged CCD, the leakage current is usually fairly uniform across the photosensitive area of the silicon chip, with the exception of various bright pixels which have an anomalous leakage current well above the overall level. Author

N83-33423# Stockholm Univ. (Sweden). Arrhenius Lab.
OPTICAL TECHNIQUES FOR STUDYING ATMOSPHERIC PROPERTIES BY MEANS OF ROCKET-BORNE UV LIGHT SOURCES
A. Zuber, A. Lundin, and G. Witt *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 167-171 refs (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

N83-33462# Centre National de la Recherche Scientifique, Verrieres-le-Buisson (France). Lab. de Physique Stellaire et Planetaire.
A HIGH RESOLUTION ULTRAVIOLET SOLAR TELESCOPE-SPECTROGRAPH MOUNTED ON AN EQUATORIAL BALLOON PLATFORM
D. Samain and P. Lemaire *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 401-407 refs Sponsored by CNES (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

N83-33463# Laboratoire d'Astronomie Spatiale, Marseille (France).
A SKY SURVEY AT BALLOON-ULTRAVIOLET WAVELENGTHS
B. Milliard, M. Laget, J. Donas, J. M. Deharveng, D. Huguenin (Geneva Observatory), and M. Viton *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 409-413 refs Sponsored by CNES and Swiss National Research Foundation (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

N83-33464# Laboratoire d'Astronomie Spatiale, Marseille (France).
THE DESIGN OF A 40 cm BALLOON ULTRAVIOLET TELESCOPE
M. Saisse, R. Grange, J. L. Boit, and A. Pauget *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 415-419 refs (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.

For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N83-33748 Brigham Young Univ., Provo, Utah.
X-RAY EMISSION FROM LASER-PRODUCED PLASMAS Ph.D. Thesis
David Patric Gaines 1982 237 p
Avail: Univ. Microfilms Order No. DA8300388

Ten to forty Angstrom X-ray emission from laser produced plasmas was studied in order to determine pertinent plasma parameters, study plasma emission characteristics under varying laser/target conditions, and in order to generate characterization data on Layered Synthetic Microstructure (LSMs). Plasma temperatures were determined and compared with temperatures obtained by other workers. The calculated temperatures were consistent, but precise temperature determination was not possible because density information was not calculable. The emission characteristics showed surprisingly little dependence on target parameters, or laser intensity. The integrated reflectivity and line width of the LSMs, as determined from this research, matched values predicted from theoretical computations. In addition, the focusing ability of LSMs was demonstrated. Dissert. Abstr.

N83-33749# Argonne National Lab., Ill. Engineering Div.
INTERELECTRODE RESISTANCE AND PERFORMANCE OF SMALL AND LARGE SCALE MHD GENERATORS
E. D. Doss and B. F. Picologlou Sep. 1983 19 p refs Backup document for publication in Journal of Energy in Jan./Feb. 1984
Avail: NTIS HC A02/MF A01

The effect of reduced interelectrode resistance in MHD generators on the generator power output is investigated. The analytical model used in the investigation allows for the solution for the electric field and current density distributions in the cross plane of the generator. The power output, expressed as a fraction of the power output of a perfectly insulated generator, is found to be a function of the wall temperature, the ratio of boundary layer thickness to channel transverse dimension, and the product of interelectrode resistance and channel cross-sectional area. The interelectrode resistance is assumed to be inversely proportional to the channel transverse dimension and the variation of power output ratio with channel size is calculated. It is found that deterioration of performance of NHD generators, resulting from reduced interelectrode resistance, diminishes with generator size and is negligible for large-scale generators, provided that the interelectrode resistance remains larger than an order of one-tenth ohm. Author

N83-33750*# TRW Space Technology Labs., Redondo Beach, Calif.
PLASMA WAVE EXPERIMENT FOR THE ISEE-3 MISSION Semiannual Report, 20 Feb. - 19 Aug. 1982
Frederick L. Scarf 13 Oct. 1982 77 p refs
(Contract NAS5-20682)
(NASA-CR-170556; NAS 1.26:170556; Rept-23499-6028-UT-00)
Avail: NTIS HC A05/MF A01 CSCL 20I

Analysis of data from a scientific instrument designed to study solar wind and plasma wave phenomena on the ISEE-3 mission is presented. The performance of work on the data analysis phase is summarized. Author

N83-33751# Nagoya Univ. (Japan). Inst. of Plasma Physics.
DISSIPATIVE TRAPPED ION INSTABILITY IN PLT AND INTOR
A. Wakamatsu, K. Shimizu, and M. Ogasawara (Keio Univ., Yokahama, Japan) Jun. 1983 21 p refs
(IPPJ-635) Avail: NTIS HC A02/MF A01

The generation conditions of the dissipative trapped ion instability (DTII) are investigated for the parameters of the Princeton Large Torus (PLT) and the International Tokamak Reactor (INTOR). The finite banana width effect is taken into account in the dispersion relation. The conditions are greatly influenced by the impurities. Though the plasmas are well in the banana regime in both PLT and INTOR, DTII is not excited for Z (eff) = 3.5, and excited but it has negative growth rate for Z (eff) = 1.5, where Z (eff) is the effective charge number. Only for the pure case (Z (eff) = 1.0), the growth rate has small positive value in INTOR. M.G.

N83-33752# Nagoya Univ. (Japan). Inst. of Plasma Physics.
HIGH-BETA BALLOONING-MODE STRUCTURES
R. Hatakeyama (Tohoku Univ., Sendai, Japan), N. Sato (Tsukuba Univ., Ibaraki, Japan), and M. Inutake Jun. 1983 22 p refs
(IPPJ-634) Avail: NTIS HC A02/MF A01

A low frequency magnetic mode is observed to grow in a line tied axisymmetric mirror with increasing plasma beta up to beta sub c predicted by ideal MHD ballooning mode theory. The instability is excited like a standing wave in a region of unfavorable curvature and steep radial pressure gradient, traveling outward from the mirror well with a velocity less than the Alfven but higher than the sound velocity. It propagates azimuthally around the ion diamagnetic drift frequency with m=2 for beta approximately < beta sub c, while appearing to propagate in the electron diamagnetic direction for beta < beta sub c. Results are consistent with ballooning mode structures. M.G.

N83-33753# Nagoya Univ. (Japan). Plasma Physics Lab.
EQUILIBRIA OF FIELD-REVERSED CONFIGURATION WITH SUBSIDIARY COILS
Masashi Kako, Tsutomu Ishimura, and Tsuneo Amano Apr. 1983 35 p refs
(IPPJ-633) Avail: NTIS HC A03/MF A01

Two-dimensional equilibria of a field-reversed configuration with subsidiary coils are computed by integrating the ideal magnetohydrodynamic equilibrium equation. The mirror coils assist to compress the plasma appreciably in the axial direction and also help sustain a literal 'compact torus', which is just smaller than the inner dimensions of the main coil. The cusp coils enlarge the plasma and consequently make the gradient of plasma density relaxed in the radial direction. M.G.

N83-33754# Nagoya Univ. (Japan). Inst. of Plasma Physics.
MOVING TOROIDAL LIMITER
Kazunari Ikuta and Akira Miyahara Jun. 1983 18 p refs
(IPPJ-636) Avail: NTIS HC A02/MF A01

The concept of the limiter-divertor by Mirnov is extended to a toroidal limiter-divertor (moving toroidal limiter) using the stream of ferromagnetic balls coated with a low Z material such as plastics, graphite and ceramics. An important advantage of the use of the ferromagnetic materials would be possible soft landing of the balls on a catcher, provided that the temperature of the balls is below Curie point. Moreover, the moving toroidal limiter would would act as a protector of the first wall not only against the vertical movement of plasma ring but also against the violent inward motion driven by a major disruption because the orbit of the ball in the case of a moving toroidal limiter distributes over the small major radius side of the toroidal plasma. M.G.

N83-33755# Illinois Univ., Urbana. Fusion Studies Lab.
CALCULATIONAL METHODS FOR FUSION-PLASMA ENGINEERING
George H. Miley 1983 5 p refs Presented at the Topical Meeting on Advances in Reactor Computations, Salt Lake City, 28-31 Mar. 1983
(Contract DE-AC02-76ET-52040)
(DE83-002879; CONF-830304-4) Avail: NTIS HC A02/MF A01

Fusion plasma engineering involves the analysis of fusion plasma behavior under realistic conditions expected in future fusion reactors, i.e., it might be viewed as applied plasma physics. In a sense, then, the study of fusion plasma engineering for a fusion reactor is analogous to studies of core neutronics (reactor physics) for a fission reactor. These methods typically involve some techniques used in basic plasma physics studies, but the application to reactor conditions brings in new demands (e.g., complex geometries and boundary conditions, nonuniform fields, impurities and neutral gas fluxes) that are frequently omitted in idealized

plasma physics calculations. These demands in turn force the use of techniques such as multigroup treatments, Monte Carlo, etc., that are traditional in fission reactor physics but have not previously found much use in plasma studies. Several methods of this type are discussed as examples and similarities as well as differences compared to fission reactor methods are stressed. DOE

N83-33756# Oak Ridge National Lab., Tenn. Physics Div.
WORKSHOP ON MEASUREMENTS OF MAGNETIC FIELDS WITHIN PLASMAS: SUMMARY
C. F. Barnett Feb. 1983 20 p Workshop held at Oak Ridge, Tenn., 28-29 Apr. 1982
(Contract W-7405-eng-26)
(DE83-005973; ORNL/TM-8561; CONF-820499-Summ) Avail: NTIS HC A02/MF A01

The measurement of magnetic fields within plasmas (or alternately the current flux distribution flowing in a plasma) was addressed. The methods, status, and anticipated results of the efforts supported by DOE/OFE are summarized. Discussions centered around the use of external magnetic probes, Faraday rotation of submillimeter laser beam, and Zeeman effect from a neutral or charged beam traversing the plasma. DOE

N83-33757# Argonne National Lab., Ill. Fusion Power Program.
PLASMA DISRUPTION FORCES: A PROGRAM FOR THE HP 9845 AND 9872 B PLOTTER
Martyn H. Foss Nov. 1982 26 p
(Contract W-31-109-eng-38)
(DE83-005415; ANL/FPP-TM-164) Avail: NTIS HC A03/MF A01

A computer program is described for the calculation of currents, forces, torques, and voltages in the conducting first wall and limiter of a Tokamak reactor experiencing a plasma quench. Instructions are given for running the program in a HP 9845 B desk top computer with a 9872 B plotter. The first wall and limiter are modelled by 44 coaxial loops. The inductance matrix among the loops is calculated, and the currents in them are calculated step by step over time; driven by the flux from the decaying plasma current and subject to the field from the plasma, from the poloidal field coils, and from all current loops. An insulating break in the limiter or first wall can be modelled by imposing a back voltage which causes all the currents in the limiter or first wall to sum to zero. This potential is related to the voltage between segments of a segmented limiter or first wall. DOE

N83-33758# Illinois Univ., Urbana. Fusion Studies Lab.
COMPACT TORI FOR ALTERNATE-FUEL FUSION
George H. Miley 1982 30 p refs Presented at the Symp. on New Trends in Unconventional Approaches to Magnetic Fusion, Stockholm, 16-18 Jun. 1982
(Contract DE-AC02-76ET-52040)
(DE83-005480; CONF-820644-5; COO-2218-257) Avail: NTIS HC A03/MF A01

A D-T burn dynamic experiment using a scaled up field reversed theta pinch device is proposed as a first step towards demonstration of a D-3He burn. The feasibility of such an experiment is based on a loss cone like confinement scaling described here plus the concept of using combined pellet and neutral beam injection to heat the plasma build up, its density, and damp the m=2 instability. The potential extension to a D-3He reactor is also discussed. DOE

N83-33759# California Univ., Livermore. Lawrence Livermore Lab.
TIME-RESOLVED X-RAY LINE DIAGNOSTICS OF LASER-PRODUCED PLASMAS
Robert L. Kauffman, Dennis L. Matthews, J. D. Kilkenny (Imperial College), and R. W. Lee (Imperial College) Nov. 1982 16 p refs Presented at the 24th American Physical Society Ann. Meeting, New Orleans, 1 Nov. 1982
(Contract W-7405-eng-48)
(DE83-005575; UCRL-87522-Rev-1; CONF-821128-3-Rev-1) Avail: NTIS HC A02/MF A01

The underdense plasma conditions of laser irradiated disks were examined using K X-ray from highly ionized ions. A 900 ps laser pulse of 0.532 micron light is used to irradiate various Z disks which have been doped with low concentrations of tracer materials. The tracers, whose Z's range from 13 to 22, are chosen so that their K X-ray spectrum is senstive to typical underdense plasma temperatures and densities. Spectral are measured using a time-resolved crystal spectrograph recording the time history of the X-ray spectrum. A spatially-resolved, time-integrated crystal spectrograph also monitors the X-ray lines. Large differences in Al spectra are observed when the host plasma is changed from SiO2 to PbO or In. Spectra are presented along with preliminary analysis of the data. DOE

N83-33760# California Univ., Livermore. Lawrence Livermore Lab.
MAGNETS FOR THE MIRROR FUSION TEST FACILITY: TESTING OF THE FIRST YIN-YANG AND THE DESIGN AND DEVELOPMENT OF OTHER MAGNETS
T. A. Kozman, S. T. Wang, Y. Chang, E. N. C. Dalder, C. L. Hanson, R. E. Hinkle, J. O. Myall, C. R. Montoya, E. W. Owen, and R. L. Palasek 1982 9 p refs Presented at the Appl. Superconductivity Conf., Knoxville, Tenn., 30 Nov. - 3 Dec. 1982
(Contract W-7405-eng-48)
(DE83-003438; UCRL-88111; CONF-821108-15) Avail: NTIS HC A02/MF A01

Completed in May 1981, the first Yin-Yang magnetic for the tandem Mirror Fusion Test Facility (MFTF-B) at Lawrence Livermore National Laboratory (LLNL) was successfully tested to its full design field (7.68 T) and current (5775 A). Since that time, the entire magnet array has been reconfigured - from the original A-cell to an axicell design. The MFTF-B magnet array now contains a total 26 large superconducting coils: 2 sets of yin-yang pairs, 2 sets of transition magnets (each containing two coils), 2 sets of axicell magnets (each containing three coils), and 12 central-cell solenoids. Recent magnet history from the testing of the initial yin-yang set, through the design of the axicell configuration, to the planned development of the system is chronicled. DOE

N83-33761# Los Alamos Scientific Lab., N. Mex. Theoretical Div.
DYNAMICAL THRESHOLDS FOR COMPLETE FUSION
Kent Thomas R. Davies, Arnold John Sierk, and James Rayford Nix 1983 20 p refs Presented at the 21 Intern. Winter Meeting on Nucl. Phys., Bormio, Italy, 24-29 Jan. 1983
(Contract W-7405-eng-36)
(DE83-006061; LA-UR-83-57; CONF-830117-1) Avail: NTIS HC A02/MF A01

It is our purpose here to study the effect of nuclear dissipation and shape parametrization on dynamical thresholds for compound-nucleus formation in symmetric heavy-ion reactions. This is done by solving numerically classical equations of motion for head-on collisions to determine whether the dynamical trajectory in a multidimensional deformation space passes inside the fission saddle point and forms a compound nucleus, or whether it passes outside the fission saddle point and reseparates in a fast-fission or deep-inelastic reaction. Specifying the nuclear shape in terms of smoothly joined portions of three quadratic surfaces of revolution, we take into account three symmetric deformation coordinates. However, in some cases we reduce the number of coordinates to two by requiring the ends of the fusing system to be spherical in shape. The nuclear potential energy of deformation is determined in terms of a Coulomb energy and a double volume energy of a Yukawa-plus-exponential folding function. DOE

N83-33762# California Univ., Davis. Dept. of Mechanical Engineering.
RESEARCH ON THE HYLIFE LIQUID-FIRST-WALL CONCEPT FOR FUTURE LASER-FUSION REACTORS: LIQUID JET IMPACT EXPERIMENTS Final Report
Myron A. Hoffman and A. Rene Raffray Aug. 1982 41 p refs
(Contract W-7405-eng-48)
(DE83-004209; UCRL-15367-PT-3; FR-8) Avail: NTIS

HC A03/MF A01

Transient and steady state drag of a single bar and of some selected arrays of bars were evaluated and the momentum removed from impacting liquid slugs determined. In order to achieve this aim, use was made of both the published literature and experimental data obtained from a small-scale experimental apparatus. The implications of two possible scaling laws for use in designing the small scale experiment are discussed. The use of near universal curves to evaluate the momentum removed during the initial transient period is described. The small scale apparatus used to obtain steady state drag data is described. Finally, these results are applied to the HYLIFE fusion reactor. DOE

N83-33763# Princeton Univ., N. J. Plasma Physics Lab.
THE DIFFUSIVITY OF HYDROGEN ISOTOPES IN LIQUID LITHIUM AND IN SOLID YTTRIUM
Robert E. Buxbaum and Ernest F. Johnson Dec. 1982 16 p refs
(Contract DE-AC02-76CH-03073)
(DE83-005050; PPPL-1960) Avail: NTIS HC A02/MF A01

The separation of tritium from liquid lithium at low concentrations is an important problem for fusion technology. One of the most promising techniques for effecting this separation involves sorbing the tritium on solid yttrium metal. Reliable diffusivity data are essential for a realistic evaluation of this technique. The bodies of relevant experimental diffusivity data, i.e., data on protium diffusion in liquid lithium, protium diffusion in solid yttrium, and the isotope effect in metals, are reviewed. DOE

N83-33764# Oak Ridge National Lab., Tenn. Fusion Energy Div.
THE RF COUPLER TECHNOLOGY FOR FUSION APPLICATIONS
D. J. Hoffman 1983 7 p refs Presented at the 5th Topical Meeting on Technol. of Fusion Energy, Knoxville, Tenn., 26 Apr. 1983
(Contract W-7405-eng-26)
(DE83-012041; CONF-830406-29) Avail: NTIS HC A02/MF A01

Radio frequency (RF) oscillations at critical frequencies have successfully provided a means of conveying power to fusion plasmas due to the electrical-magnetic properties of the plasma. While large RF systems to couple power to the plasma were designed, built, and tested, the main link to the plasma, the coupler, is still in an evolutionary stage of development. Design and fabrication of optimal antennas for fusion applications are complicated by incomplete characterizations of the harsh plasma environment and of coupling mechanisms. A brief description of RF coupler technology required for plasma conditions is presented along with an assessment of the status and goals of coupler development. DOE

N83-33765# Texas Univ., Austin. Inst. for Fusion Studies.
NON-INTRINSIC AMBIPOLAR DIFFUSION IN TURBULENCE THEORY
H. L. Berk and K. Molvig (MIT, Cambridge) Mar. 1983 12 p refs
(Contract DE-FG05-80ET-53088)
(DE83-010321; DOE/ET-53088/83; IFSR-83) Avail: NTIS HC A02/MF A01

Ambipolar flow in a turbulent plasma is investigated by combining a WKB treatment of the waves with a turbulent collision operator resulting from either quasi-linear theory or certain renormalized turbulence theories. If the wave momentum has a flow from outgoing waves, then particle diffusion is not intrinsically ambipolar, and the time variation of the electric potential profile is determined by the turbulent spectrum. However, in most cases of practical interest, as in the drift wave problem, this effect is small; and, in steady state, equal rates of stochastic diffusion are predicted for electrons and ions. DOE

N83-33766# Texas Univ., Austin. Inst. for Fusion Studies.
BALLOONING-MODE CALCULATIONS IN STELLARATORS
H. L. Berk, M. N. Rosenbluth, and J. L. Shohet (Wisconsin Univ., Madison) Mar. 1983 19 p refs
(Contract DE-FG05-80ET-53088)
(DE83-010322; DOE/ET-53088/87; IFSR-87) Avail: NTIS HC A02/MF A01

Ballooning equations that are readily integrated by a field line following code are written. The asymptotic properties of the ballooning mode equation are analyzed to rederive the Mercier condition in a form particularly well suited for our computations. The low beta stability properties for three typical configurations, Proto-Cleo, Wistor U and a Heliac where the magnetic fields are due to actual vacuum plus the currents arising from a localized pressure gradient are evaluated. DOE

N83-33767# General Atomic Co., San Diego, Calif.
MINORITY ICRF CURRENT DRIVE IN TOROIDAL DEVICES
V. S. Chan and S. C. Chiu Apr. 1983 15 p refs Presented at the Tech. Meeting on Non-Inductive Current Drive in Tokamaks, Abingdon, Engl., 18-21 Apr. 1983 Submitted for publication
(Contract DE-AT03-76ET-51011; GA Proj. 3235)
(DE83-010957; GA-A-17087; CONF-830452-1; GA-A-16353) Avail: NTIS HC A02/MF A01

To determine the plasma parameters that are necessary to produce an asymmetric k parallel spectrum required for asymmetric heating, antennae coupling in a slab geometry is considered. The antenna are treated as current filaments infinite in the y-(poloidal) direction and backed by a perfect conducting sheet. The density gradient is taken to be in the x-direction and coupling to the fast waves is considered. The wave equation is solved using an outgoing wave condition for large x. The k sub z spectrum is shown for four antennae phased at theta = pi/2 for two different thicknesses of the low density region in front of the antenna. The asymmetry of the spectrum is quite sensitive to this thickness with a thicker low density region producing a more asymmetric spectrum. DOE

N83-33768# Georgia Inst. of Tech., Atlanta. School of Nuclear Engineering and Health Physics.
RIPPLE REDUCTION COILS FOR TOKAMAK REACTORS
Glenn Bateman and J. R. Fox 28 Mar. 1983 7 p refs
(Contract DE-AS05-78ET-52025)
(DE83-011091; GTFR-41) Avail: NTIS HC A02/MF A01

Ripple Reduction Poloidal Field (RRPF) coils together with blocks of ferro-magnetic iron shielding are used to design a commercial Tokamak reactor similar in size to STARFIRE with only eight rather than twelve toroidal field (TF) coils. The RRPF coils function like segmented poloidal field coils, placed between the TF coils and the neutron shielding, carrying an average of plus or minus 6 MA turns of current in the toroidal direction. Together with an additional pair of vertical field coils carrying 4.8 MAT, they produce the poloidal field needed for a beta approximately = 6% plasma equilibrium with elongation 1.66 and a pair of separatrices suitable for a poloidal divertor. The RRPF coils also reduce magnetic ripple near the top and bottom of the plasma while the laminated blocks of iron magnetic shielding placed under each TF coil reduce magnetic ripple near the midplane from a maximum of 5.48% to less than 1%. DOE

N83-33769# Massachusetts Inst. of Tech., Cambridge. Plasma Fusion Center.
HESTER: A HOT-ELECTRON SUPERCONDUCTING TOKAMAK EXPERIMENTAL REACTOR AT M.I.T.
Joel H. Schultz and D. Bruce Montgomery Apr. 1983 202 p refs
(Contract DE-AC02-78ET-51013)
(DE83-011628; DOE/ET-51013/53; PFC-RR-82-24) Avail: NTIS HC A10/MF A01

HESTER is an experimental Tokamak, designed to resolve many of the central questions in the Tokamak development program in the 1980's. It combines several unique features with new perspectives on the other major Tokamak in rough order of their presently perceived importance, are the achievement of reactor like wall loadings and plasma parameters for long pulse periods, determination of a good, reactor relevant method of steady state or very long pulse Tokamak current drive, duplication of the

planned very high temperature neutral injection experiments using only radio frequency heating, a demonstration of true steady state Tokamak operation, integration of a high performance superconducting magnet system into a Tokamak experiment, determination of the best methods of long term impurity control, and studies of transport and pressure limits in high field, high aspect ratio Tokamak plasmas. These objectives are described. DOE

N83-33770# Los Alamos Scientific Lab., N. Mex.
PLASMA FOCUS EXPERIMENTS POWERED BY EXPLOSIVE GENERATORS
B. L. Freeman, R. S. Caird, D. J. Erickson, C. M. Fowler, W. B. Garn, H. W. Kruse, J. C. King, D. E. Bartram, and P. J. Kruse 1983 28 p refs Presented at the 3rd Intern. Conf. on Megagauss Magnetic Field Generation and Related Topics, Novosibirsk, USSR, 13-17 Jun. 1983
(Contract W-7405-eng-36)
(DE83-011166; LA-UR-83-1083; CONF-830606-5) Avail: NTIS HC A03/MF A01

The plasma focus project began as an effort to develop an intense, pulsed, expendable neutron radiographic source. Since previous efforts to power a plasma focus with explosive generators were successful, we proposed to couple plate generators to a coaxial-geometry plasma focus to achieve this goal. Utilizing a small capacitor bank and a selected set of diagnostics, the explosive experiments were successfully conducted with maximum currents of 1.5 MA to 2.4 MA. A maximum neutron yield of approx. 3 x 10 (11) (DD) neutrons was achieved at the 2.4 MA level. Since the neutron yield did scale as a power of the maximum delivered current, and the neutron-producing source region was small, this approach is an attractive option to achieve a neutron radiographic source. The need for a reliable open-circuiting switch at several megamperes has resulted in postponement of the project. DOE

N83-33771# Sandia Labs., Albuquerque, N. Mex.
TIME-RESOLVED MEASUREMENTS OF HYDROGEN AND DEUTERIUM IN THE ASDEX PLASMA BOUNDARY
J. Roth (Technische Univ.), P. Varga, A. P. Martinelli, B. M. U. Scherzer, Cheng-Kai Chen (Academia Sinica), W. R. Wampler, and E. Taglauer 1982 23 p refs Presented at the 5th Intern. Conf. on Plasma Surface, Gatlinburg, Tenn., 3 May 1982
(Contract DE-AC04-76DP-00789)
(DE82-017025; SAND-82-1269C; CONF-820545-9) Avail: NTIS HC A02/MF A01

Hydrogen and the plasma boundary of ASDEX using graphite collector probes. Time resolution of the order of 100 ms can be obtained by rotating the cylindrical probes behind an aperture during the discharge. The trapped amount of hydrogen was determined by subsequent thermal desorption; in the analyses of deuterium the D((3)Ee,p) (4)He nuclear reaction was used. Both methods yield quantitative results. Measurements were done for limiter and divertor discharges in the range of 4 to 20 cm outside the limiter or separatrix. The time distributions show a maximum flux at the beginning and the end of the discharge. The relatively lower fux during the plateau phase of the discharge is in the range 10(15) to 2 x 10(17) cm(+2) sec(+1), depending on the radial probe position; the maximum values are higher by a factor of 5 to 50. During neutral hydrogen injection, an additional maximum can be observed. The radial 1/e-decay length is about 0.9 cm in front and 0.4 cm behind the fixed limiter. The results are compared with independent measurements in ASDEX and other plasma machines. DOE

N83-33772# California Univ., Livermore. Lawrence Livermore Lab.
PLASMA ENGINEERING FOR MARS
G. A. Carlson, D. E. Baldwin, W. L. Barr, B. M. Boghosian, R. H. Bulmer, R. B. Campbell (TRW, Inc.), R. S. Devoto, G. W. Hamilton, B. M. Johnston, W. N. Kumai et al 24 Mar. 1983 7 p refs Presented at the 5th Topical Meeting on Technol. of Fusion Energy, Knoxville, Tenn., 26-28 Apr. 1983
(Contract W-7405-eng-48)
(DE83-010367; UCRL-88238; CONF-830406-25) Avail: NTIS HC A02/MF A01

The two-year Mirror Advanced Reactor Study (MARS) has resulted in the conceptual design of a commercial, electricity-producing fusion reactor based on tandem mirror confinement. The physics basis for the MARS reactor was developed through work in two highly coupled areas of plasma engineering: magnetics and plasma performance. DOE

N83-33773# General Atomic Co., San Diego, Calif.
THEORY OF LOWER-HYBRID-CURRENT DRIVE AT LOW DENSITIES
V. S. Chan, C. S. Liu, F. W. McClain, and M. Rosenberg Feb. 1983 6 p refs Presented at the 5th Topical Conf. on Radio Frequency Plasma Heating, Madison, Wis., 21 Feb. 1983
(Contract DE-AT03-76ET-51011)
(DE83-006950; CONF-830210-1; GA-A-16984) Avail: NTIS HC A02/MF A01

Efficient toroidal current sustainment by LH waves was demonstrated experimentally on a number of Tokamaks at low densities. A theoretical model invoking the nonlinear excitation of magnetized plasma waves was proposed to explain many interesting features observed in these experiments which include enhanced SXR, cyclotron emissions and electrostatic fluctuations. Analysis of a set of moment equations deduced from this analytical mode predicts the existence of relaxation oscillations in perpendicular temperature and plasma wave energy which have subsequently been observed experimentally in certain situations. Due to the excessive stiffness of the moment equations, it is not possible to ascertain the conditions under which relaxation oscillations will occur. It is thus necessary to resort to a detailed kinetic analysis. A Fokker-Planck wave kinetic code was constructed which takes into account the nonlinear excitation of the plasma waves and follows the temporal evolution of these waves as well as the electron distribution during the RF current drive. Studies with the code show either relaxation oscillations or a steady state with significantly higher plasma wave energy depending on RF power level. The details of this and other dependences and comparison with experiments are reported. DOE

N83-33774# Fom-Instituut voor Plasmafysica, Jutphaas (Netherlands).
[EXPERIMENTAL AND THEORETICAL ACTIVITIES IN PLASMA PHYSICS] Annual Status Report, 31 Dec. 1982
Mar. 1983 92 p refs Sponsored by Nederlandse Organisatie voor Zuiver-WetenschappelizkOnderzoek (ZWO) and Euratom
Avail: NTIS HC A05/MF A01

Experimental research on plasma pinches; turbulent plasma heating; plasma diagnostics; gas blanket and Tokamaks; and electron cyclotron resonance heating is described. Theoretical investigations of magnetohydrodynamics; wave dynamics; and transport problems are summarized. Author (ESA)

N83-33775# Uppsala Ionospheric Observatory (Sweden).
ON WAVE MODES IN A PLASMA NEAR THE LOWER HYBRID FREQUENCY Ph.D. Thesis
Hannu E. J. Koskinen Apr. 1983 62 p refs
(UIO-SR-83-03; ISSN-0349-2699) Avail: NTIS HC A04/MF A01

The wave mode structure in a magnetized plasma near and below the lower hybrid frequency is studied. Definitions of cut-offs and resonances in cold plasma theory are reviewed and the effects introduced by more than one ion component are discussed. Thermal effects are included by microscopic treatment. The solution of the Vlasov equation is treated as an initial value problem in the presence of a magnetic field, and the Bernstein modes are discussed. The full electromagnetic dispersion equation is studied numerically for a realistic multiion plasma model of the auroral ionosphere at an altitude of 400 km. The particle distributions are taken to be stable Maxwellians. Owing to the strong Landau damping of the components propagating parallel to the magnetic field at these frequencies, the numerical computations are restricted to perpendicular propagation. The dependence of the width of the lower hybrid plateau on the finite plasma Beta is demonstrated by

varying temperature and magnetic field independently.
Author (ESA)

N83-33776# Centre National de la Recherche Scientifique, Meudon (France). Lab. d'Aerothermique.
ELECTRON DENSITY AND TEMPERATURE MEASUREMENTS IN AN ARGON PLASMA BY LANGMUIR PROBE AND UV ABSORPTION [MESURES DANS UN PLASMA D'ARGON DES TEMPERATURES ET DES DENSITES ELECTRONIQUES PAR SONDE DE LANGMUIR ET ABSORPTION U.V.]
M. Dudeck, G. Poissant (Univ. Pierre et Marie Curie, Paris), and B. Rowe (Univ. Pierre et Marie Curie, Paris) May 1982 74 p refs In FRENCH
(Rept-82-1; Publ-666; ISSN-0248-451-X) Avail: NTIS HC A04/MF A01

The reliability of the Langmuir probe was investigated by comparing probe results with those obtained by ultraviolet spectroscopy in a plasmatron. Electron density and temperature were measured in the subsonic flow of an argon plasma with an electron temperature of 3000K, 5% ionization, and static pressure = 0.071 torr. The influence of probe dimensions, amplitude, and signal shape and frequency was studied. Results show that probe data are reliable. Conditions for optimum utilization are outlined.
Author (ESA)

N83-33445# Technische Universitaet, Brunswick (West Germany). Inst. fuer Geophysik und Meteorologie.
GROUND BASED OBSERVATIONS OF AN IMPULSIVELY INCREASED PLASMA FLOW FROM THE TAIL
N. Kloecker, H. Luehr, S. Thuerey, and E. Nielsen (Max-Planck Inst. fuer Aeronomie, Katlenburg-Lindau, West Germany) *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 295-298 refs (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

N83-33447# Max-Planck-Institut fuer Aeronomie, Katlenburg-Lindau (West Germany).
OBSERVATIONS OF AURORAL E-REGION PLASMA IN JOINT ROCKET/SCANDINAVIAN TWIN AURORAL RADAR EXPERIMENT (STARE)
E. Nielsen *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 307-310 refs (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

N83-33461# Tuebingen Univ. (West Germany). Inst. of Astronomy.
HOT PLASMAS IN INTERSTELLAR SPACE
M. Grewing *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 397-400 refs (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

N83-33663# Tokyo Denki Univ. (Japan). Dept. of Electronic Engineering.
THE MEASUREMENT OF AMBIPOLAR-DIFFUSION COEFFICIENT OF Ar2+ IN A HIGH TEMPERATURE ARGON PLASMA AFTERGLOW
T. Kaneda, R. M. Hobson (York Univ.), and Jen-Shih Chang (McMaster Univ.) *In its* Res. Repts. of the Fac. of Eng., Tokyo Denki Univ., No. 30 Dec. 1982 p 89-94 refs Sponsored in part by the National Science and Engineering Research Council of Canada (For primary document see N83-33656 21-70)
Avail: NTIS HC A08/MF A01

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Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

N83-33777# Electrotechnical Lab., Ibaraki (Japan).
RESEARCHES OF THE ELECTROTECHNICAL LABORATORY, NO. 832: STABILITY IMPROVEMENT AND NEW MONITORING METHOD OF A SUPERCONDUCTING MAGNET
Harehiko Nomura Feb. 1983 131 p refs In JAPANESE; ENGLISH summary
(ISSN-0366-9106) Avail: NTIS HC A07/MF A01

Advantages of using high purity aluminum as a stabilizer are examined. The process of development of aluminum clad superconductors and magnets is given. A new method of monitoring the safety of a superconducting magnet by detecting acoustic burst signals emitted by the superconductor and the magnet by detecting acoustic burst signals emitted by the superconductor and the magnet is presented. Theoretical treatment of a superconductor itself that emits acoustic bursts is given. Data observed on a composite copper multifilamentary Nb-Ti conductor in various magnetizing conditions are presented. Results of new acoustic monitoring are demonstrated.
Author

N83-33778# Argonne National Lab., Ill.
NEUTRON TOTAL SCATTERING CROSS SECTIONS OF ELEMENTAL ANTIMONY
A. B. Smith, P. T. Guenther, and J. F. Whalen Nov. 1982 24 p refs
(Contract W-31-109-eng-38)
(DE83-005641; ANL/NDM-75) Avail: NTIS HC A02/MF A01

Neutron total cross sections are measured from 0.8 to 4.5 MeV with broad resolutions. Differential-neutron-elastic-scattering cross sections are measured from 1.5 to 4.0 MeV at intervals of 50 to 200 keV and at scattering angles distributed between 20 and 160 degrees. Lumped-level neutron-inelastic-scattering cross sections are measured over the same angular and energy range. The experimental results are discussed in terms of an optical-statistical model and are compared with respective values given in ENDF/B-V.
DOE

N83-33779# Sandia Labs., Albuquerque, N. Mex.
CROSSOVER FROM LOCALIZED TO MOBILE ELECTRONS IN Qn(TCNQ) SUB 2
W. G. Clark, K. Glover, M. D. Lan, and L. J. Azevedo 1982 7 p refs Presented at the Low Dimensional Contractors Conf., St. Maurice, France, 10 Dec. 1982 Prepared in cooperation with California Univ., L.A.
(Contract DE-AC04-76DP-00789)
(DE83-009291; SAND-83-0684C; CONF-821226-3) Avail: NTIS HC A02/MF A01

Nuclear spin-lattice relaxation measurements are reported for Qn(TCNQ)2 over the magnetic field range 10 Oe to 120 kOe at temperatures between 4.2 K and 100 K. They indicate that a crossover from localized to mobile 1-d electrons occurs near 20 K. The distance an electron diffuses before confinement by a barrier or jumping to another chain varies from 30 A at 19 K to 155 at 100 K. The observed behavior is consistent with diffusion among random barriers.
DOE

N83-33780# Sandia Labs., Albuquerque, N. Mex.
X-RAY DIFFRACTION AND DOPING STUDIES OF Ga (AsP)/GaP STRAINED-LAYER SUPERLATTICES GROWN BY METAL ORGANIC CHEMICAL VAPOR DEPOSITION
R. M. Biefeld, G. C. Osbourn, P. L. Gourley, I. J. Fritz, and T. E. Zipperian Mar. 1983 9 p refs Presented at the Electrochem. Soc. Meeting, San Francisco, 8 May 1983
(Contract DE-AC04-76DP-00789)
(DE83-006738; CONF-830508-3) Avail: NTIS HC A02/MF A01

Metal organic chemical vapor deposition was used to prepare strained layer superlattices in the GaAs + GaP system. Both the composition and the layer thickness can be determined by X-ray diffraction. For very thick layers a direct measure of the strain in the layers can be obtained by X-ray diffraction. H2Se and Zn(C2H5)2 was used to prepare n and p type superlattices, respectively. Carrier concentrations in the range of 5 x 10(16) to 5 x 10(18) cm(+3) were achieved for n type superlattices and

1 x 10(17) to 1 x 10(18) cm(+3) for p type superlattices with mobilities of 46 to 183 cm(2) V sec. The growth and characterization of these materials will be discussed. DOE

N83-33781# Argonne National Lab., Ill.
CONCEPTUAL DESIGN OF A 4-GeV HEXAGONAL MICROTRON
T. K. Khoe 1982 4 p Presented at the Conf. on New Horizons on Electromagnetic Phys., Charlottesville, Va., 21-24 Apr. 1982
(Contract W-31-109-eng-38)
(DE83-008864; CONF-820475-5) Avail: NTIS HC A02/MF A01

A higher-order variant of the microtron which offers an attractive option for furnishing cw electron beams at 4 GeV is described. The accelerator is a six-sided microtron consisting of three dispersive straight sections and three dispersion-free straight sections of constant length where three linacs are located. DOE

N83-33782# Brookhaven National Lab., Upton, N. Y.
SUPERCONDUCTING COMBINED FUNCTION MAGNETS
H. Hahn and R. C. Fernow 1983 4 p refs Presented at the Particle Accelerator Conf., Santa Fe, N. Mex., 21-23 Mar. 1983
(Contract DE-AC02-76CH-00016)
(DE83-010059; BNL-32734; CONF-830311-23) Avail: NTIS HC A02/MF A01

Superconducting accelerators and storage rings, presently under construction or in the design phase, are based on separate dipole and quadrupole magnets. It is suggested that a hybrid lattice configuration consisting of dipoles and combined function gradient magnets would: reduce the number of magnet units and their total cost; and increase the filling factor and thus the energy at a given field. Coil cross sections are presented for the example of the Brookhaven Colliding Beam Accelerator. An asymmetric two-layer cable gradient magnet would have transfer functions of 10.42 G/A and 0.628 G cm(+1)/A versus 15.77 G/A and 2.03 G cm(+1)/A of the present separate dipoles and quadrupoles. DOE

N83-33783# Northwestern Univ., Evanston, Ill. Dept. of Materials Science and Engineering.
INVESTIGATION OF DEEP LEVEL DEFECTS IN EPITAXIAL SEMICONDUCTING ZINC SULPHO-SELENIDE Progress Report, 15 Jun. 1982 - 14 Jun. 1983
Bruce W. Wessels 15 Feb. 1983 72 p refs
(Contract DE-AC02-79ER-10390)
(DE83-007523; DOE/ER-10390/5) Avail: NTIS HC A04/MF A01

Optical deep level transient spectroscopy (DLTS) on doped, undoped and irradiated ZnSe was performed. Doping of ZnSe with nitrogen resulted in the formation of relatively shallow acceptor states as determined by DLTS. This is the first direct electrical evidence for shallow acceptor states in ZnSe. N-n heterojunctions fabricated from the ZnSe/GaAs epitaxial layers and built-in voltages different from the theoretically predicted values. DOE

N83-33784# Minnesota Univ., Minneapolis. Dept. of Chemical Engineering and Materials Science.
MICROSTRUCTURAL APPROACH TO FATIGUE-CRACK PROCESSES IN POLYCRYSTALLINE BCC MATERIALS Annual Technical Progress Report
William W. Gerberich 1 Mar. 1983 21 p refs
(Contract DE-AC02-79ER-10433)
(DE83-007912; DOE/ER-10433/T1; ATPR-4) Avail: NTIS HC A02/MF A01

The following were studied: strain-rate sensitivity of Ti-30 Mo after cyclic stabilization, cyclic stress-strain of Ti-30 Mo, plastic strain distributions in Fe-4% Si single crystal cleavage, fatigue closure and thresholds in Fe binary alloys, and fatigue crack thresholds in HSLA steel. DOE

N83-33785# Cambridge Univ. (England). Dept. of Engineering.
MICROSCOPING ASPECTS OF DIFFUSION CREEP
M. F. Arzt, M. F. Ashby, and R. A. Verrall 1982 57 p refs
(PB83-187401; CUED/C/MATS-TR-60-1982; ISSN-0309-6505)
Avail: NTIS HC A04/MF A01 CSCL 20B

The classical theory of diffusional flow of a polycrystal, which treats it as a continuum diffusion problem, was extended to include details of dislocation type defects which act as sinks and sources for matter. It was shown that the rate of creep depends on the density and mobility of these defects. Constitutive laws for the deformations were developed. In the limit of pure materials of normal grain size, the laws all reduced to the classical theory for diffusional flow. When impurities or solutes exert a drag on the defects the characteristics of the deformation change. These effects were analyzed in detail, and where possible, were compared with experimental data; good qualitative agreement was found. The model appeared to explain many confusing experimental observations. GRA

N83-33660# Tokyo Denki Univ. (Japan).
PREPARATION OF AMORPHOUS SILICON FILMS BY GLOW DISCHARGE DEPOSITION METHOD. HIGHLY PHOTOCONDUCTIVE FILM FORMATION UNDER dc ELECTRIC FIELD SUPERIMPOSED ON RF PLASMA
K. Homma, K. Ebara, T. Fukami, Y. Kobayashi, Y. Abe, and T. Aono *In its* Res. Repts. of the Fac. of Eng., Tokyo Denki Univ., No. 30 Dec. 1982 p 41-64 refs In JAPANESE; ENGLISH summary (For primary document see N83-33656 21-70)
Avail: NTIS HC A08/MF A01

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N83-33786# Pennsylvania Univ., Philadelphia.
COSMOLOGY, INFLATION, AND SUPERSYMMETRY
Andreas Albrecht, Savas Dimopoulos (Harvard Univ., Cambridge, Mass.), W. Fischler, Edward W. Kolb (Los Alamos Scientific Lab., N. Mex.), Stuart Raby (Los Alamos Scientific Lab., N. Mex.), and Paul J. Steinhardt 1982 15 p refs Presented at the 3rd Marcel Grossman Meeting on the Recent Development of General Relativity, Shanghai, China, 28 Aug. 3 Sep. 1982
(Contract W-7405-eng-36)
(DE83-001062; LA-UR-83-2947; CONF-820882-1) Avail: NTIS HC A02/MF A01

Cosmological consequences of supersymmetric grand unified models based on the Witten-O'Raifeartaigh potential are discussed. In particular the development of the phase transition in the spontaneous breaking of supersymmetry is studied. Realistic models where light fields feel supersymmetry breaking only through coupling to massive fields, e.g., the Geometric Hierarchy model, the universe does not inflate or reheat. Thus, the standard cosmological flatness, monopole, and horizon problems remain. In addition, the transition is never completed, in the sense that the universe remains dominated by coherent Higgs field energy, resulting in an apparent matter dominated universe with omega = to >. DOE

N83-33787# Brookhaven National Lab., Upton, N. Y.
PHENOMENOLOGICAL CONSEQUENCES OF SUPERSYMMETRY
Ian Hinchliffe (LBL) and L. Littenberg 1982 18 p refs Presented at the DPF Summer Study on Elementary Particle Phys. and Future Facilities, Aspen, Colo., 28 Jun. 1982
(Contracts DE-AC02-76CH-00016; DE-AC03-76SF-00098)
(DE83-003724; BNL-32110; CONF-8206116-8) Avail: NTIS HC A02/MF A01

The phenomenological consequences of supersymmetric theories, and the implications of such theories for future high energy machines are discussed. High energy predictions of supersymmetry and low energy consequences (for example in the K/sub o/anti K/sub o/ system) are discussed in the context of future experiments and are mentioned briefly only in the context of constraining existing

models. A brief section is included on the implication for proton decay, although detailed experimental questions are not discussed. Section 1 consists of a brief review of supersymmetry and the salient features of existing supersymmetric models. Section 2 deals with the consequences for nucleon decay of SUSY. The remaining sections then discuss the physics possibilities of various machines; e anti e in Section 3, ep in Section 4, pp (or anti pp) colliders in Section 5 and fixed target hadron machines in Section 6. DOE

N83-33788# Florida Univ., Gainesville. Dept. of Physics.
CLASS OF CONFORMALLY INVARIANT QUANTUM FIELD THEORIES
E. Braaten, T. Curtright, G. Ghandour (Kuwait Univ.), and C. Thorn 1982 10 p refs
(Contract DE-AS05-81ER-40008)
(DE83-011588; DOE/ER-40008/32) Avail: NTIS HC A02/MF A01

A general family of two-dimensional field theories of the Liouville type, involving one or more scalar fields, is shown to be conformally invariant when quantized canonically over a large class of Fock spaces. DOE

N83-32973 Polish Academy of Sciences, Warsaw.
SECTION OF THERMODYNAMIC FOUNDATIONS OF NEW METHODS FOR ENERGY CONVERSION
In its Sci. Activities of the Polish Acad. of Sci. 1983 p 55-61
(For primary document see N83-32969 21-31)
Avail: Issuing Activity

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

N83-33789# Committee on Science and Technology (U. S. House).
US SCIENCE AND ENGINEERING EDUCATION AND MANPOWER: BACKGROUND; SUPPLY AND DEMAND; AND COMPARISON WITH JAPAN, THE SOVIET UNION AND WEST GERMANY
Edith Fairman Cooper Washington GPO 1983 271 p refs Presented to the Subcomm. on Sci., Res. and Technol. of the Comm. on Sci. and Technol., 98th Congr., 1st Sess., Apr. 1983 Prepared by the Library of Congr., Congr. Res. Serv.
(GPO-19-177) Avail: Subcommittee on Science, Research and Technology

Scientific and technical education in the United States as it relates to the supply and demand of science and engineering manpower; scientific and technical education in Japan, the Soviet Union, and West Germany; potential directions for science and engineering manpower; the supply of Department of Defense scientists and engineers in the United States and a history of Congressional concern and some actions taken by the National Science Foundation related to science and engineering education are addressed. Author

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N83-33790# Committee on Science and Technology (U. S. House).
THE NATIONAL SCIENCE BOARD: SCIENCE POLICY AND MANAGEMENT FOR THE NATIONAL SCIENCE FOUNDATION 1968-1980
Genevieve Knezo and Kenneth Bogen Washington GPO 1983 750 p refs Presented to the Subcomm. on Sci., Res. and Technol. of the Comm. on Sci. and Technol., 98th Congr., 1st Sess., Jan. 1983 Prepared by the Library of Congr., Congr. Res. Serv.
(GPO-80-976) Avail: Subcommittee on Science, Research and Technology

The evolution of the National Science Board's responsibilities and procedures, the executive committee, the programs committee, the planning and policy committee, budget making, annual reports, national science policy-related activities, the National Science Foundation, (NSF) membership, advisory committees, the NSF advisory council, audit and oversight, the NSF in basic research, big and little science, science education, and science and society are addressed. Author

N83-33791# Committee on Science and Technology (U. S. House).
SEVENTH BIENNIAL CONFERENCE ON NATIONAL MATERIALS POLICY
James E. Mielke and Lennard G. Kruger Washington GPO 1983 169 p Presented to the Comm. on Sci. and Technol., 98th Congr., 1st Sess., Mar. 1983 Prepared by the Library of Congr., Congr. Res. Serv.
(GPO-16-627) Avail: Committee on Science and Technology

The importance of a secure supply of materials and minerals at reasonably stable prices was addressed. While it was generally acknowledged that actions such as stockpiling, materials substitution, expanding domestic minerals production, and enhanced materials R&D can help reduce the nation's materials vulnerability, debate centered on the nature and extent of the Federal Government's role in facilitating and coordinating these actions. The task forces were charged with the responsibility of examining the major critical materials issues and developing an action oriented set of recommendations for government, industry, and academia. These issues are research and development; engineering education, manpower, and training; materials availability; institutional and industrial factors related to national materials policy; and materials as a technological force in productivity. Author

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software.*

N83-33792*# National Aeronautics and Space Administration, Washington, D. C.
RECORDS OF ACHIEVEMENT: NASA SPECIAL PUBLICATIONS
1983 141 p Original contains color illustrations
(NASA-SP-470; NAS 1.21:470) Avail: NTIS and NASA Scientific and Technical Information Facility, P.O. Box 8757, B.W.I. Airport, Md. 21240 CSCL 05B

This annotated bibliography cites all NASA Special Publications issued since 1961. The Reference Publications and Conference Publications are included. Entries are arranged by SP number. The entries are grouped in eight categories: general, handbooks and data compilations, histories and chronologies, technology utilization, management evaluation and analysis standards, bibliographies, space vehicle design criteria, and specifications. The Reference Publications and Conference Publications are listed separately according to RP and CP number. Approximately 1400 entries are listed. Each entry includes the title, author, NASA accession number, NASA SP, RP, or CP number, original sales source, and publication date. An index of the SP, RP, and CP numbers according to NASA subject category is provided. Highlights of NASA's achievements since 1958 are included as a tribute to NASA's 25th anniversary. A.R.H.

N83-33793# Rochester Univ., N. Y. Lab. for Laser Energetics.
INFORMATION-MANAGEMENT DATA BASE FOR FUSION-TARGET FABRICATION PROCESSES
J. Reynolds 1982 16 p refs Presented at the 29th Natl. Symp. on Am. Vacuum Soc., Baltimore, 16 Nov. 1982
(Contract DE-AC08-80DP-40124)

(DE83-005233; DOE/DP-40124/2; CONF-821111-21) Avail: NTIS HC A02/MF A01

A computer-based data-management system was developed to handle data associated with target-fabrication processes including glass microballoon characterization, gas filling, materials coating, and storage locations. The system provides automatic data storage and computation, flexible data-entry procedures, fast access, automated report generation, and secure data transfer. It resides on a CDC CYBER 175 computer and is compatible with the CDC data-base--language Query Update, but is based on custom FORTRAN software interacting directly with the CYBER's file-management system. The described data base maintains detailed, accurate, and readily available records of fusion targets information. DOE

N83-33794# Automation Industries, Inc., Silver Spring, Md. Vitro Labs. Div.
AVAILABILITY OF SOLAR ENERGY REPORTS FROM THE NATIONAL SOLAR DATA PROGRAM
Jan. 1983 74 p
(Contract DE-AC01-79CS-30027)
(DE83-011084; SOLAR/0020-83/43) Avail: NTIS HC A04/MF A01

The various types of reports published by the National Solar Data Program are discussed. The reports identified include: performance reports, bulleting on special solar topics, environmental data reports, solar project description reports and cost reports, program information reports, comparative reports, and reliability and material assessment reports. DOE

N83-33795# Internationale Dokumentationsgesellschaft fuer Chemie m.b.H., Frankfurt am Main (West Germany). Datenverarbeitung und Entwicklung.
USE OF CHEMICAL ABSTRACTS SERVICE (CAS) DATA BASES. STRUCTURE FILE. CONVERSION Final Report, Nov. 1982
Armin Jungblut Bonn Bundesministerium fuer Forschung und Technologie Apr. 1983 46 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-ID-83-002; ISSN-0170-8996) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 9,50

Computer programs were developed in order to register chemistry information. The central registry form in which all registry structures are converted, and the conversion product of the CAS Registry 3 structures representing a topological file are described. Problems in the conversion of CAS structures with charges on adjacent nonmetal atoms, taking into account the neighborhood of the charged atoms, are discussed. The conversion of CAS structures formed by several components, and the conception of the conversion into the GREMAS code of the polymers are described. Results of routinely performed conversions are presented. Author (ESA)

N83-33265# Meteorological Satellite Center, Tokyo (Japan).
EDITING AND CALIBRATION OF HRPT DATA
Shinobu Nakajima and Tadao Aoki *In its* Sum. of TOVS Data Process. System Mar. 1983 p 25-48 ref In JAPANESE; ENGLISH summary (For primary document see N83-33262 21-42)
Avail: NTIS HC A08/MF A01

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

No abstracts in this category.

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

N83-33796# Committee on Science and Technology (U. S. House).
1984 FAA R&D AUTHORIZATION
Washington GPO 1983 77 p Hearing before the Subcomm. on Transportation, Aviation and Mater. of the Comm. on Sci. and Technol., 98th Congr., 1st Sess., 22 Mar. 1983
(GPO-22-259) Avail: Subcommittee on Transportation, Aviation and Materials

The oversight of the FAA, its plans for modernizing the Nation's air traffic control system, and its use of funds authorized by the Airport and Airway Improvement Act are reviewed. Author

N83-33797# Committee on Science and Technology (U. S. House).
PACIFIC BASIN STUDY MISSION
Washington GPO Jan. 1983 150 p Presented to the Comm. on Sci. and Technol., 98th Congr., 1st Sess., Jan. 1983
(GPO-15-550) Avail: Committee on Science and Technology

A study mission to the Antarctic, New Zealand, Australia, and Japan is summarized. Energy and economic conditions are reviewed. N.W.

N83-33798*# National Aeronautics and Space Administration, Washington, D. C.
STATEMENT BEFORE THE COMMITTEE ON SCIENCE AND TECHNOLOGY, US HOUSE OF REPRESENTATIVES
Stuart J. Evans 26 Jan. 1982 18 p refs
(NASA-TM-85409; NAS 1.15:85409) Avail: NTIS HC A02/MF A01 CSCL 05D

The Small Business Innovation Development Act is addressed. Technological innovation, Federal research and development needs, and private sector communication are addressed. Author

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N83-33799*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
VEHICLE TEST REPORT: SOUTH COAST TECHNOLOGY ELECTRIC VOLKSWAGEN RABBIT WITH DEVELOPMENTAL LOW-POWER ARMATURE CHOPPER
J. E. Marte, J. A. Bryant, and R. Livingston Jun. 1983 57 p refs Sponsored by NASA
(Contract DE-AI01-78CS-54209)
(NASA-CR-172987; JPL-Pub-83-45; DOE/CS-54209/12; NAS 1.26:172987) Avail: NTIS HC A04/MF A01 CSCL 13F

Dynamometer performance of a South Coast Technology electric conversion of a Volkswagen (VW) Rabbit designated SCT-8 was tested. The SCT-8 vehicle was fitted with a transistorized chopper in the motor armature circuit to supplement the standard motor speed control via field weakening. The armature chopper allowed speed control below the motor base speed. This low speed control was intended to reduce energy loss at idle during stop-and-go traffic; to eliminate the need for using the clutch below base motor speed; and to improve the drivability. Test results indicate an improvement of about 3.5% in battery energy economy for the SAE J227a-D driving cycle and 6% for the C-cycle with only a minor reduction in acceleration performance. A further reduction of about 6% would be possible if provision were made for shutting down field power during the idle phases of the driving

cycles. Drivability of the vehicle equipped with the armature chopper was significantly improved compared with the standard SCT Electric Rabbit. Author

N83-33800*# Garrett Turbine Engine Co., Phoenix, Ariz.
ADVANCED GAS TURBINE (AGT) POWERTRAIN SYSTEM DEVELOPMENT FOR AUTOMOTIVE APPLICATIONS Semiannual Progress Report, Jan. - Jun. 1981
Dec. 1981 87 p refs Prepared for DOE, Washington, D.C.
(Contract DEN3-167)
(NASA-CR-167901; DOE/NASA/0167-81/3; NAS 1.26: 167901; GARRETT-31-3725(3); SAPR-3) Avail: NTIS HC A05/MF A01 CSCL 13F

Compressor development, turbine, combustion, regenerator system, gearbox/transmission, ceramic material and component development, foil gas bearings, bearings and seals, rotor dynamics development, and controls and accessories are discussed. Author

N83-33801# California Univ., Livermore. Lawrence Livermore Lab.
FEDERAL TECHNOLOGY TRANSFER TO THE PUBLIC SECTOR IN THE '80'S: APPLICATION FROM HAWAII. FEDERAL LABORATORY CONSORTIUM FOR TECHNOLOGY TRANSFER
G. T. Richards 1982 13 p Presented at the Am. Soc. for Public Admin., Honolulu, Hawaii, 21 Mar. 1982
(Contract W-7405-eng-48)
(DE83-003036; UCRL-87433; CONF-8203104-1) Avail: NTIS HC A02/MF A01

Better utilization of science and technology developed by the federal government has always been a goal of both the public and private sectors. Historically, the commercialization process of this government research has been a slow, tedious one, relying primarily on the private sector's ability to search-out and extract desired information while operating from outside of the government structure. The Federal Laboratory Consortium for Technology Transfer (FLC) was designed to help facilitate this transfer process by providing an access channel and internal assistance for both public and private sector potential users. The FLC provides a systematic approach to improve the utilization of our technology and shorten the time required for the process to complete its cycle. Public Law 96-480 establishes the requirement for the federal government to support domestic technology transfer, and the FLC provides a vehicle for the government to be responsive to the intent of the law. DOE

N83-33802# Purdue Univ., Lafayette, Ind. Electric and Hybrid Vehicle Systems Development Lab.
ENGINEERING FIELD TEST OF ELECTRIC VEHICLES Final Report
L. L. Ogborn and A. T. McDonald Dec. 1982 135 p refs
(Contract DE-AC02-80CS-50110)
(DE83-009539; DOE/CS-50110/1) Avail: NTIS HC A07/MF A01

The development of a digital data acquisition system (DAS) for use in electric vehicle (EV) research, development, and engineering field test programs is reported. The system is designed for use in mission activities, as well as for accumulating baseline vehicle performance data. The system architecture, hardware components, and modular software design are described. Sensor choices, system installation, calibration, and operation are also treated. Methods of handling and processing of EV data are discussed. Discussion of problems encountered and precautions required for satisfactory operation should be useful in future programs. Complete hardware and software documentation is included. DOE

N83-33803# Los Alamos Scientific Lab., N. Mex.
EXPERIMENTAL INVESTIGATION OF ONBOARD STORAGE AND REFUELING SYSTEMS FOR LIQUID-HYDROGEN-FUELED VEHICLES
Walter F. Stewart Sep. 1982 212 p refs
(Contract W-7405-eng-26)
(DE83-010316; DOE/CE-0039) Avail: NTIS HC A10/MF A01

A hydrogen fueled automotive vehicle project to evaluate state of the art capabilities in engine conversion for hydrogen operation, liquid-hydrogen onboard storage, and liquid hydrogen refueling was conducted. It is indicated that liquid hydrogen storage to operate vehicle and routine refueling of the vehicle can be accomplished over an extended period. Two different liquid hydrogen vehicle onboard storage tanks designed for vehicular applications were tested in actual road operation: the first was an aluminum Dewar with a liquid hydrogen capacity of 110 1; the second was a Dewar with an aluminum outer vessel, two copper, vapor cooled thermal radiation shields, and a stainless steel inner vessel with a liquid hydrogen capacity of 155 1. The car was refueled with liquid hydrogen at least 65 times involving more than 8.1 kl of liquid hydrogen during the 17 months that the car was operated on liquid hydrogen. The vehicle had a range without refueling of about 274 km with the first liquid hydrogen tank and about 362 km with the second tank. The vehicle achieved 2.4 km/l of liquid hydrogen which corresponds to 9.4 km/l gasoline on an equivalent energy basis. DOE

88 SPACE SCIENCES (GENERAL)

N83-33645# Kyoto Univ. (Japan). Dept. of Physics.
A BALLOON-BORNE FAR-INFRARED TELESCOPE WITH A NEW AZIMUTH STABILIZATION SYSTEM
Norihisa Hiromoto, Toshinori Maihara, Naoki Oda, Haruyuki Okuda, and Hiroshi Shibai *In* Kyoto Univ. Mem. of the Fac. of Sci., Kyoto Univ., Ser. of Phys., Astrophys., Geophys. and Chem., Vol. 36, No. 2 Mar. 1983 p 281-289 refs (For primary document see N83-33643 21-70)
Avail: NTIS HC A09/MF A01

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N83-33804# Virginia Univ., Charlottesville. Dept. of Astronomy.
STABILITY OF RADIATIVE SHOCK WAVES
J. N. Imamura and R. H. Durisen [1982] 5 p refs Presented at the H.E.A.D. Workshop on Cataclysmic Variables and Low Mass X-ray Binaries, Cambridge, Mass. 12-15 Jan. 1983
Avail: NTIS HC A02/MF A01

The possibility that pulsed X-ray emission might be a common property of these sources is reviewed. Results of linear and nonlinear analyses are presented. The observational implications of our work are discussed. Author

N83-33805# Fermi National Accelerator Lab., Batavia, Ill.
UNDERGROUND NEUTRINO ASTRONOMY
David N. Schramm Feb. 1983 7 p refs Presented at a Workshop on Sci. Underground, Los Alamos, N. Mex., 27 Sep. - 2 Oct. 1982 Prepared in cooperation with Chicago Univ., Ill.
(Contracts DE-AC02-80ER-10773; DE-AC02-76CH-03000; Grant NSF AST-81-16750)
(DE83-008914; F-CONF-83/22; CONF-820989-6) Avail: NTIS HC A02/MF A01

Possible astronomical neutrino sources detectable with underground facilities are reviewed. Solar neutrinos and gravitational collapse neutrinos are discussed and ultrahigh energy astronomical neutrino sources are emphasized. The exotic possibility of monopolonium is suggested. DOE

N83-33806# Los Alamos Scientific Lab., N. Mex.
LINEAR RADIAL PULSATION THEORY: LECTURE 5
A. N. Cox 1983 11 p refs Presented at the Swiss Soc. of Astrophys. and Astronomy Conf., Saas Fee, Switzerland, 21-26 Mar. 1983
(Contract W-7405-eng-36)

(DE83-010093; LA-UR-83-785; CONF-830337-5) Avail: NTIS HC A02/MF A01

A method for getting an equilibrium stellar envelope model using as input the total mass, the envelope mass, the surface effective temperature, the total surface luminosity, and the composition of the envelope is described. With the structure of the envelope model known, a method for obtaining the radial pulsation periods and growth rates for low order modes is presented. The large amplitude pulsations observed for the yellow and red giants and supergiants are always these radial models, but for the stars nearer the main sequence, as for all of the stars and for the white dwarfs, there frequently are nonradial modes occurring also. Linear theory radial pulsation theory is applied to the giant star sigma Scuti variables, while the linear nonradial theory will be used for the B-stars in later lectures. DOE

N83-33807# Los Alamos Scientific Lab., N. Mex.
STELLAR-OPACITY CALCULATIONS, 2: LECTURE 3
A. N. Cox 1983 16 p Presented at the Swiss Society of Astrophysics and Astromony Conf., Saas Fee, Switzerland, 21-26 Mar. 1983
(Contract W-7405-eng-36)
(DE83-009996; LA-UR-83-783; CONF-830337-3) Avail: NTIS HC A02/MF A01

The effects on opacities of atomic lines and molecular bands are discussed. It was the realization that these atomic lines were important for the opacity and the radiation flow in stars that allowed the field of stellar evolution to greatly flower in the 1960's and 1970's. Our understanding of stellar structure and evolution is now very deep. DOE

N83-33808# Los Alamos Scientific Lab., N. Mex.
STELLAR-OPACITY CALCULATIONS, 1: LECTURE 2
A. N. Cox 14 Mar. 1983 24 p refs Presented at the Swiss Soc. of Astrophys. and Astronomy Conf., Saas Fee, Switzerland, 21-26 Mar. 1983
(Contract W-7405-eng-36)
(DE83-009995; LA-UR-83-782; CONF-830337-2) Avail: NTIS HC A02/MF A01

Stellar structure, evolution, stability, and pulsation or explosion were studied and it is noted that three very vital pieces of physical information are needed. It is assumed that the composition is known from observations of assumption. To construct a model of a star the following information is needed: the nuclear generation rates which give the luminosity the star emits and the pressure and energy equation of state which determines the flow of radiation through the star. The equation of state and opacity are discussed. DOE

N83-33809# Los Alamos Scientific Lab., N. Mex.
NONLINEAR HYDRODYNAMICS: LECTURE 9
A. N. Cox 14 Mar. 1983 18 p Presented at the Swiss Society of Astrophysics and Astronomy, Saas Fee, Switzerland, 21-26 Mar. 1983
(Contract W-7405-eng-36)
(DE83-010082; LA-UR-83-789; CONF-830337-9) Avail: NTIS HC A02/MF A01

A method for calculating the stability and pulsations of stars which make contact with actual observations of the stellar behavior, in which hydrodynamic calculations are very simple in principle is discussed. Conservation of mass can be accounted for by having mass shells that are fixed with their mass for all time. Motions of these shells are calculated by taking the difference between the external force of gravity and that from the local pressure gradient. The conservation of energy is coupled to this momentum conservation equation to give the current temperatures, densities, pressures, and opacities at the shell centers, as well as the positions, velocities, and accelerations of the mass shell interfaces. Energy flow across these interfaces is calculated from the current conditions, and this energy is partitioned between internal energy and the work done on or by the mass shell. The purely radial case for hydrodynamics because which is useful for stellar pulsation studies is outlined. DOE

N83-33810# European Southern Observatory, Munich (West Germany).
[ACTIVITIES IN ASTRONOMY] Annual Report, 1982
L. Woltjer 1982 71 p refs In ENGLISH, FRENCH and GERMAN Original contains color illustrations
(ISSN-0531-4496) Avail: NTIS HC A04/MF A01

Observations of X-ray sources, variable stars, the Magellanic clouds, the solar system, Seyfert galaxies and interstellar matter are summarized. Progress in compiling a sky survey and atlas is discussed. Telescopes, CCD cameras, spectrometers, a faint object camera, and infrared photometers are described. Image processing capabilities are outlined. Author (ESA)

N83-33646# Kyoto Univ. (Japan). Dept. of Astromony.
AN AUTOGUIDER SYSTEM FOR THE 40 CM SCHMIDT TELESCOPE
Hiroshi Ohtani, Takashi Ichikawa, Toshiyuki Sasaki, Kyoji Saito, and Tamiyuki Tsujimura *In* Kyoto Univ. Mem. of the Fac. of Sci., Kyoto Univ., Ser. of Phys., Astrophys., Geophys. and Chem., Vol. 36, No. 2 Mar. 1983 p 291-303 refs (For primary document see N83-33643 21-70)
Avail: NTIS HC A09/MF A01

N83-33649# Kyoto Univ. (Japan). Dept. of Physics.
NEAR-INFRARED SOURCE COUNTS IN THE GALACTIC PLANE. PART 2: A LIST OF NEAR-INFRARED SOURCES
Kimiaki Kawara, Takashi Kozasa, Shuji Sato, Haruyuki Okuda, Yukiyasu Kobayashi, and Jun Jugaku *In* Kyoto Univ. Mem. of the Fac. of Sci., Kyoto Univ., Ser. of Phys., Astrophys., Geophys. and Chem., Vol. 36, No. 2 Mar. 1983 p 353-392 refs Prepared in cooperation with the Inst. of Space and Astronautical Science, Tokyo and Tokyo Univ. Sponsored in part by the Asahi Press Science Foundation (For primary document see N83-33643 21-70)
Avail: NTIS HC A09/MF A01

N83-33470# Bonn Univ. (West Germany). Inst. fuer Astrophysik und Extraterrestrische Forschung.
STATEMENT ON THE FUTURE OF EXPERIMENTAL WORK IN THE FIELD OF SOUNDING ROCKET AND BALLOON RESEARCH: ASTROPHYSICS
H. J. Fahr *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 459-461 (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N83-33811 Princeton Univ., N. J.
MOLECULAR GAS NEAR THE GALACTIC CENTER Ph.D. Thesis
Gary Meyer Heiligman 1982 109 p
Avail: Univ. Microfilms Order No. DA8301408

The interstellar matter within 400 pc of the center of the Milky Way Galaxy was studied using millimeter wave spectroscopy. The region was surveyed in the lambda = 2.72 mm transition of (C-13)O. Spectra of the 12CO and C18O emission lines near lambda = 2.60 and 2.73 mm were taken along eight lines of sight within the survey region to estimate the excitation temperatures and column densities. Two forms of molecular gas were seen in the central region: clouds with radii of 20 pc, excitation temperatures approximately 8 K, and mass of approximately 100,000 solar mass and diffuse regions with T(x) of 25 K, densities of > 50,000 cm/3 and linewidths > 30 km. A total mass of roughly 1.2 x 10 to the 8th power solar mass was derived for the interstellar matter in the inner 400 pc of the Galaxy. A model of closed orbits in a barlike bulge potential was developed to simulate the kinematic motions of the gas in the inner 400 pc of the Galaxy. The model accounts for most but not all of the high velocity features. Dissert. Abstr.

N83-33812*# California Univ., Livermore. Lawrence Livermore Lab.
ELECTRON HEATING AT INTERPLANETARY SHOCKS
W. C. Feldman, J. R. Asbridge, S. J. Bame, J. T. Gosling, and R. D. Zwickl 1982 23 p refs Presented at the 5th Solar Wind Conf., Woodstock, Vt., 1-5 Nov. 1982 Sponsored in part by NASA
(Contract W-7405-eng-36)
(NASA-CR-172850; NAS 1.26:172850; DE83-006067;
LA-UR-83-259; CONF-821159-1) Avail: NTIS HC A02/MF A01

Data for 41 forward interplanetary shocks show that the ratio of downstream to upstream electron temperatures, T/sub e/(d/u) is variable in the range between 1.0 (isothermal) and 3.0. On average, (T/sub e/(d/u) = 1.5 with a standard deviation, sigma e = 0.5. This ratio is less than the average ratio of proton temperatures across the same shocks, (T/sub p/(d/u)) = 3.3 with sigma p = 2.5 as well as the average ratio of electron temperatures across the Earth's bow shock. Individual samples of T/sub e/(d/u) and T/sub p/(d/u) appear to be weakly correlated with the number density ratio. However the amounts of electron and proton heating are well correlated with each other as well as with the bulk velocity difference across each shock. The stronger shocks appear to heat the protons relatively more efficiently than they heat the electrons. DOE

N83-33813# California Univ., Berkeley. Lawrence Berkeley Lab.
EXPERIMENTAL EVIDENCE THAT AN ASTEROID IMPACT LED TO THE EXTINCTION OF MANY SPECIES 65 MILLION YEARS AGO
Luis W. Alvarez Sep. 1982 73 p refs Presented at the Natl. Acad. of Sci. Ann. Meeting, Washington, D.C., 26 Apr. 1982 Submitted for publication
(Contract DE-AC03-76SF-00098)
(DE83-001359; LBL-1409; CONF-820488-1) Avail: NTIS HC A04/MF A01

The development of the theory that the mass extinction of the dinosaurs at the Cretaceous-Tertiary boundary was caused by as asteroid impact is reviewed. The scientists involved, the objections to the theory, and the evidence refuting those objections are presented chronologically. DOE

N83-33814# Los Alamos Scientific Lab., N. Mex.
CATACLYSMIC VARIABLES AS PROBES OF X-RAY PROPERTIES OF INTERSTELLAR GRAINS
M. F. Bode, A. Evans (Keele Univ.), and G. A. Norwell (Keele Univ.) 1983 7 p refs Presented at the 7th North Am. Workshop on Cataclysmic Variables and Low-Mass X-ray Binaries, Boston, 12-15 Jan. 1983
(Contract W-7405-eng-36)
(DE83-009888; LA-UR-83-892; CONF-830135-1) Avail: NTIS HC A02/MF A01

Interstellar grain properties were probed at wavelengths ranging from the infrared to the ultraviolet. It is shown recently that it is possible to observe the effects of scattering by such grains at X-ray wavelengths. It is suggested that investigations of the X-ray properties of interstellar grains may profitably be conducted in sight lines to variable souces. Cataclysmic variables and related objects are emphasized. DOE

N83-33815# Royal Greenwich Observatory, Herstmonceux (England).
THE ENERGY DISTRIBUTIONS OF SUBGIANT AND GIANT STARS
D. J. Stickland 1983 24 p refs
(Roy-Obs-Bull-190; ISSN-0308-5074) Avail: NTIS HC A02/MF A01; HMSO £3.50; PHI

The optical region energy distributions of 25 subgiants and 14 giants, taken from the list of MK standard stars, were recorded with a spectrum scanner. Coude spectra of most of the stars were secured and line blocking coefficients were measured semiautomatically. Using these values together with the tables of line blocking, the continuum energy distributions were derived. These were compared with predicted fluxes. Discrepancies are found which, particularly for the cooler stars, may point to an inability to find the continuum as a prerequisite for measuring the line blocking and to the inadequacy of theoretical blanketing, while in the case of the hotter stars, they may indicate deficiencies in the computer codes. Author (ESA)

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights. For spacecraft design see *18 Spacecraft Design Testing, and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

N83-33816 California Univ., San Diego.
COMETARY ATMOSPHERES Ph.D. Thesis
Maximus Lawrence Marconi 1982 163 p
Avail: Univ. Microfilms Order No. DA8301003

A sequence of hydrodynamic models of the region of the cometary atmosphere bounded by the comet surface and the inner shock is developed. In each case, assuming spherical symmetry and steady state flow, the hydrodynamic equations of continuity, momentum, and energy are solved self-consistently for a varying number of fluids and phases with the equations of radiative transfer in a number of wavelength intervals for a multi-species atmosphere. In the first model a dust-free-fluid atmosphere with UV radiative transfer in three intervals is obtained for a pure H2O nucleus. It is seen that the combination of strong IR and expansion cooling dominate the flow in the inner coma, generating a strong temperature inversion and highly supersonic flow. In the outer coma UV heating dominates, driving the temperature up to approx. 800 K. The model is extended by including the effets of dust and treating the hydrogen as a separate fluid/quasi-fluid mixture. Finally, in the last model the H2O is replaced by a clathrate mixture of H2O, CO2, and N2 and the electrons treated as a separate fluid. Dissert. Abstr.

N83-33817 Institut d'Aeronomie Spatiale de Belgique, Brussels.
AN ESTIMATE OF THE SOLAR RADIATION INCIDENT AT THE TOP OF PLUTO'S ATMOSPHERE
E. vanHemelrijck 1983 44 p refs Submitted for publication
(Aeronomica-Acta-A-255-1983) Avail: Issuing Activity

The intensity and planetary-wide distribution of daily solar radiation on Pluto as well as the latitudinal variation of the seasonal and annual average insolation for three fixed values of the obliquity were calculated. Maximum solar radiation occurs over the poles around summer solstices with absolute maximum at the south pole. Over the entire Pluto year polar insolation is greater than that of the equator. The large eccentricity of Pluto produces significant north-south seasonal asymmetries in daily insolation, whereas the change in obliquity causes a global latitudinal redistribution, although the general pattern of the contour maps illustrating the variability of the daily solar radiation with latitude and season is nearly similar. In the equatorial region summer and winter are repeated twice a year. In summer mean insolation increases at the poles, remains constant at latitude 20 deg, but decreases at the equator. In winter, an increase of the obliquity yields a mean daily insolation which is reduced at all latitudes. Author (ESA)

N83-33818 Institut d'Aeronomie Spatiale de Belgique, Brussels.
THE IMPLICATIONS OF THE ORBIT CHARACTERISTICS OF THE EUROPEAN KEPLER PROJECT [LES IMPLICATIONS DES CARACTERISTIQUES ORBITALES DU PROJET EUROPEEN KEPLER]
J. Vercheval 1983 18 p In FRENCH; ENGLISH summary Submitted for publication
(Aeronomica-Acta-A-256-1983) Avail: Issuing Activity

The orbit characteristics of a satellite which studies the Martian atmosphere by absorption spectroscopy in the visible wavelength during Sun occultation by the planet are described. The satellite

circumnavigates the planet twice during the Martian year. It passes the equator at 0, 6, 12 and 18hr local time, with + or - 1hr time tolerance and + or - 15 deg latitude tolerance. It passes the south pole during solstices. Most of the observations are made at altitudes <2,000 km. Author (ESA)

N83-33819 Institut d'Aeronomie Spatiale de Belgique, Brussels.
THE EFFECT OF ORBITAL ELEMENT VARIATIONS ON THE MEAN SEASONAL DAILY INSOLATION ON MARS
E. vanHemelrijck 1983 29 p refs Submitted for publication
(Aeronomica-Acta-A-259-1983) Avail: Issuing Activity

Changes in the mean seasonal insolations on Mars caused by significant large scale variations in the eccentricity, (e) obliquity, (o) and the longitude of perihelion (p) were investigated. Although long term periodic oscillations of e and p produce very small or no variations respectively in the average yearly insolation, fluctuations strongly effect the mean summer and winter daily insolations. Between the two extreme values of the orbital elements used, the seasonal insolations exhibit a change in amplitude of 15 to 20% difference over the entire latitude interval. Summertime insolation experiences a nearly similar variation as the mean annual daily insolation, i.e., a decrease of 7% at the equator and a more than twofold increase at the poles. The corresponding mean winter daily insolation varies maximally by approximately 60% in the 60 to 80 deg latitude range. Author (ESA)

N83-33820*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ANTARCTIC METEORITE NEWSLETTER, VOLUME 6, NUMBER 2
Aug. 1983 22 p Sponsored in part by NSF
(NASA-TM-85408; NAS 1.15:85408) Avail: NTIS HC A02/MF A01 CSCL 03B

Meteorites from the 1981 and 1982 Antarctic collection are listed showing classification, weight, degree of weathering, degree of fractionation, % Fa, and % Fs. Physical and petrigraphic characteristics are described for 23 samples from the Allan Hills, Thiel Mountains, the Pecora Escarpment, and the Elephant Moraine locations. A.R.H.

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N83-33821# Electrotechnical Lab., Ibaraki (Japan).
RESEARCHES OF THE ELECTROTECHNICAL LABORATORY, NO. 830: MEASUREMENT OF THE SOLAR SPECTRAL IRRADIANCE AT TANASHI, TOKYO (III)
Mitsuhiro Habu, Mamoru Suzuki, and Takehiko Nagasaka Jan. 1983 179 p refs
(ISSN-0366-9106) Avail: NTIS HC A09/MF A01

Spectral irradiance on the horizontal plane produced by global solar radiation, that is, the combination of direct solar radiation and sky brightness was measured. Measured data of 318 sets were obtained and are classified according to seasons, grades of atmospheric turbidity, and total cloud amount. The relationships between the correlated color temperature of solar radiation and solar altitude, between the chromaticity coordinates of solar radiation and the Planckian locus, and between the illuminance produced by global solar radiation and solar altitude were examined. Tables show untreated measured values for each set, and data obtained by linear interpolation from the measured values. The spectral irradiance curve is given for easier intutitional understanding of the measured values. A.R.H.

N83-33822# Los Alamos Scientific Lab., N. Mex.
SOLAR-WIND MINOR IONS: RECENT OBSERVATIONS
S. J. Bame 1982 33 p refs Presented at the 5th Solar Wind Conf., Woodstock, Vt., 1-5 Nov. 1982
(Contract W-7405-eng-36)
(DE83-006076; LA-UR-83-257; CONF-821159-3) Avail: NTIS HC A03/MF A01

Systematic studies show that the minor ions generally travel with a common bulk speed and have temperatures roughly proportional to their masses. It was determined that the He-3(++) content varies greatly; He-3(++)/He-4(++) ranges from as high as 100 values to below .0002. In some solar wind flows which can be related to energetic coronal events, the minor ions are found in unusual ionization states containing Fe(+16) as a prominent ion, showing that the states were formed at unusually high temperatures. Unexpectedly, in a few flows substantial quantities of He-4(+) were detected, sometimes with ions identifiable as O(+2) and O(+3). Surprisingly, in some of these examples the ionization state is mixed showing that part of the plasma escaped the corona without attaining the usual million degree temperatures while other parts were heated more nearly in the normal manner. Additionally, detailed studies of the minor ions have increased our understanding of the coronal expansion. DOE

N83-33823*# Applied Physics Lab., Johns Hopkins Univ., Laurel, Md.
SOLAR WIND IRON ABUNDANCE VARIATIONS AT SOLAR WIND SPEEDS UP TO 600 km s SUP -1, 1972 TO 1976
D. G. Mitchell, E. C. Roelof, and S. J. Bame (LASL) 1982 27 p refs Presented at the 5th Solar Wind Conf., Woodstock, Vt., 1-5 Nov. 1982
(Grant NAGw-264; Contract W-7405-eng-36)
(NASA-CR-172849; NAS 1.26:172849; DE83-006077;
LA-UR-83-258; CONF-821159-2) Avail: NTIS HC A03/MF A01

The Fe/H ratios in the peaks of high speed streams (HSS) were analyzed during the decline of Solar Cycle 20 and the following minimum (October 1972 to December 1976). The response of the 50 to 200 keV ion channel of the APL/JHU energetic particle experiment (EPE) on IMP-7 and 8 was utilized to solar wind iron ions at high solar wind speeds (V > or = 600 km/sec). Fe measurements with solar wind H and He parameters were compared from the Los Alamos National Laboratory (LANL) instruments on the same spacecraft. In general, the Fe distribution parameters (bulk velocity, flow direction, temperature) are found to be similar to the LANL He parameters. Although the average Fe/H ration in many steady HSS peaks agrees within observational uncertainties with the nominal coronal ratio of 4.7 x 0.00001, abundance variations of a factor of up to 6 are obtained across a given coronal-hole associated HSS. DOE

N83-33824# Los Alamos Scientific Lab., N. Mex.
PROPOSED GEOLOGICAL SOLAR NEUTRINO MEASUREMENT
George A. Cowan and Wick C. Haxton 1982 5 p refs Presented at the Workshop on Sci. Underground, Los Alamos, N. Mex., 27 Sep. - 1 Oct. 1982
(Contract W-7405-eng-36)
(DE83-003489; LA-UR-82-3158; CONF-820989-1) Avail: NTIS HC A02/MF A01

It may be possible to measure the boron-8 solar neutrino flux, flux, averaged over the past several million years, from the concentration of technetium-98 in molybdenum-rich ore. This geochemical experiment could provide the first test of nonstandard solar models that suggest a relation between the chlorine-37 solar neutrino puzzle and the most recent glacial epoch. The necessary conditions for achieving a meaningful measurement are identified and discussed. DOE

N83-33825*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PLASMA PROPERTIES OF DRIVER GAS FOLLOWING INTERPLANETARY SHOCKS OBSERVED BY ISEE-3
R. D. Zwickl, J. R. Ashbridge, S. J. Bame, W. C. Feldman, J. T. Gosling, and E. J. Smith 1982 14 p refs Presented at the 5th Solar Wind Conf., Woodstock, Vt., 1-5 Nov. 1982 Prepared in cooperation with Los Alamos Scientific Lab., N. Mex.
(Contract W-7405-eng-36)
(NASA-CR-172837; NAS 1.26:172837; DE82-007547;
LA-UR-83-348; CONF-821159-4) Avail: NTIS HC A02/MF A01

Plasma fluid parameters calculated from solar wind and magnetic field data obtained on ISEE 3 were studied. The characteristic properties of driver gas following interplanetary shocks was determined. Of 54 shocks observed from August 1978 to February 1980, nine contained a well defined driver gas that was clearly identifiable by a discontinuous decrease in the average proton temperature across a tangential discontinuity. While helium enhancements were present in all of nine of these events, only about half of them contained simultaneous changes in the two quantities. Often the He/H ratio changed over a period of minutes. Simultaneous with the drop in proton temperature the helium and electron temperature decreased abruptly. In some cases the proton temperature depression was accompanied by a moderate increase in magnetic field magnitude with an unusually low variance and by an increase in the ratio of parallel to perpendicular temperature. The drive gas usually displayed a bidirectional flow of suprathermal solar wind electrons at higher energies. DOE

N83-33466# World Radiation Center, Davos (Switzerland). Physikalischmeteorologisches Observatorium.
SOLAR RADIOMETRY FROM HIGH ALTITUDE BALLOONS
R. W. Brusa, C. Froehlich, and Ch. Wehrli *In* ESA Sixth ESA Symp. on European Rocket and Balloon Programs and Related Res. Jun. 1983 p 429-433 refs (For primary document see N83-33397 21-46)
Avail: NTIS HC A21/MF A01

93 SPACE RADIATION

Includes cosmic radiation; and inner and outer Earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N83-33826*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
X-RAY EMISSION FROM CLUSTERS OF GALAXIES
R. F. Mushotzky May 1983 31 p refs Presented at the Workshop on Hot Astrophys. Plasmas, Nice, 8-10 Nov. 1982 Submitted for publication
(NASA-TM-85021; NAS 1.15:85021) Avail: NTIS HC A03/MF A01 CSCL 03B

Some X-ray spectral observations of approximately 30 clusters of galaxies from HEAO-1 are summarized. There exists strong correlations between X-ray luminosity, L(x), and temperature kT in the form L(x)alphaT to the 2.3 power. This result combined with the L(x) central galaxy density relation and the virial theorem indicates that the core dadius of the gas should be roughly independent of L(x) or KT and that more luminous clusters have a greater fraction of their virial mass in gas. The poor correlation of KT and optical velocity dispersion seems to indicate that clusters have a variety of equations of state. There is poor agreement between X-ray imaging observations and optical and X-ray spectral measures of the polytropic index. Most clusters show Fe emission lines with a strong indication that they all have roughly 1/2 solar abundance. The evidence for cooling in the cores of several clusters is discussed based on spectral observations with the Einstein solid state spectrometer. Author

N83-33278# Nagoya Univ. (Japan).
AN OBSERVATION SYSTEM OF COSMIC RADIO NOISE ABSORPTION BY RIOMETERS USING CORNER-REFLECTOR ANTENNAS
Masanori Nishino, Yoshihito Tanaka, Yasuo Katoh, and Akira Iwai *In* Nagoya Univ. Proc. of the Res. Inst. of Atmospherics, Nagoya Univ., Vol. 30 Mar. 1983 p 37-47 refs Sponsored in part by the Japanese Ministry of Education (For primary document see N83-33274 21-42)
Avail: NTIS HC A06/MF A01

N83-33280# Nagoya Univ. (Japan).
A HIGH-GAIN, BROADBAND, STEERABLE, DECAMETRIC ARRAY TO OBSERVE JOVIAN RADIO EMISSION: A 4-ELEMENT ARRAY
Takashi Watanabe, Tetsuo Kamada, Tatsuki Ogino, Hidehiko Jindo, Susumu Tkuda, and Koichi Ota *In* Nagoya Univ. Proc. of the Res. Inst. of Atmospherics, Nagoya Univ., Vol. 30 Mar. 1983 p 61-69 refs Sponsored in part by Japanese Ministry of Education (For primary document see N83-33274 21-42)
Avail: NTIS HC A06/MF A01

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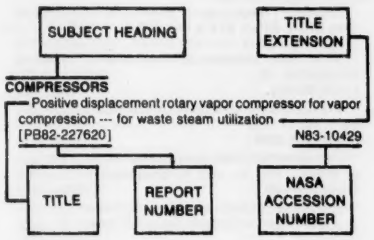

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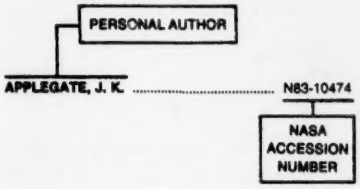

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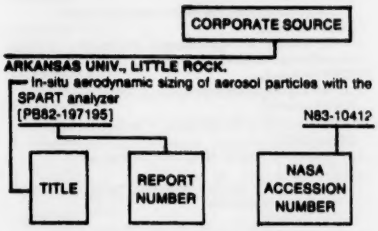

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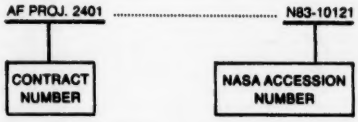

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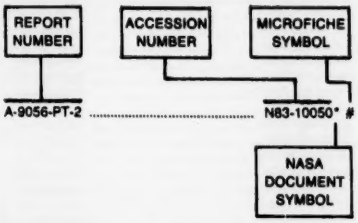

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